GOVDOC
BRA
918

BOSTON
PUBLIC
LIBRARY

DOC
RA
18

LOBSTER TERMINAL AND WATERFRONT PARK

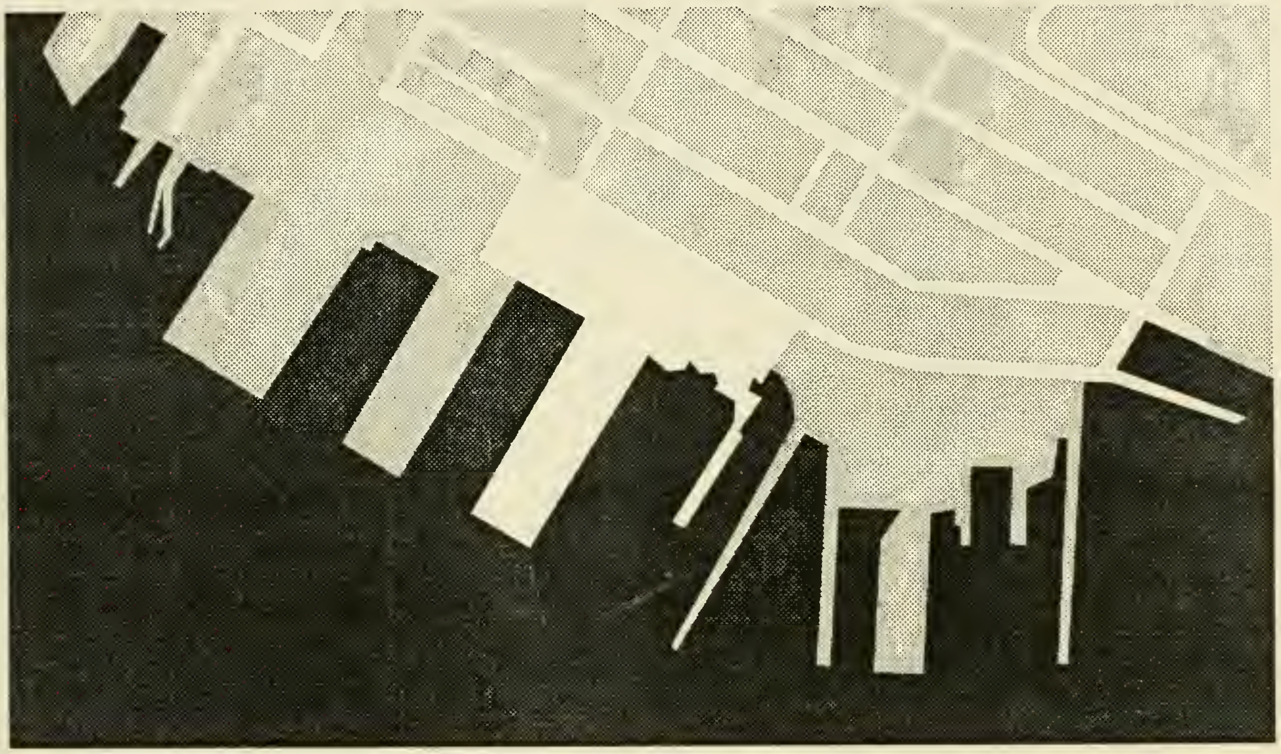
DRAFT ENVIRONMENTAL IMPACT REPORT

EOEA NO. 5671 MPA CONTRACT NO. 5.036A JULY 10, 1989

BOSTON PUBLIC LIBRARY

PREPARED FOR:

MASSACHUSETTS PORT AUTHORITY
REAL ESTATE AND DEVELOPMENT DEPARTMENT
TEN PARK PLAZA
BOSTON, MA 02116



PREPARED BY:

HMM ASSOCIATES, INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

IN ASSOCIATION WITH:

HAYDEN-WEGMAN, INC.
CAROL R. JOHNSON & ASSOCIATES, INC.
HENDERSON PLANNING GROUP
TSOI-KOBUS & ASSOCIATES
J.D. KOPPERNAES ENGINEERING, LTD.
TOXIKON CORPORATION

HMM ASSOCIATES, INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

HMM Ref. No. 1752-138/ENV-997

July 31, 1989

Dear Reviewer:

Attached is a Draft Environmental Impact Report (Draft EIR) for the Lobster Terminal and Waterfront Park. This is the first phase of the redevelopment of the East Boston Piers. This phase consists of a lobster terminal on Pier 5 and a waterfront park on Pier 4.

This project is proposed in response to a State legislative mandate (Chapter 349 of the Acts of 1986, found in Appendix B) to provide for development of facilities in the Boston Harbor for the lobster fishing industry, to provide a neighborhood park for the East Boston community, and to revitalize Massport's East Boston Piers property.

This Draft EIR has been prepared in accordance with the Massachusetts Environmental Policy Act (MEPA) and with the scope of work outlined in the Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form dated September 23, 1985. Comments regarding this project should be submitted to the MEPA office within a 30-day public comment period. This comment period will be initiated by a notice of availability published in the Environmental Monitor. Comments and questions regarding the MEPA process should be addressed to:

Secretary: EOEA
100 Cambridge Street - Room 2000
Boston, MA 02202
ATTN: MEPA Unit; EOEA No. 5671
(617) 727-5830

If you have any questions regarding this project, do not hesitate to contact me.

Very truly yours,

for Margaret B. Briggs
Project Manager

MBB:dlb

196 Baker Avenue • Concord • Massachusetts • 01742 • (508) 371-4000 • FAX: (508) 371-2468
Three Executive Park Drive • Bedford • New Hampshire • 03102 • (603) 647-1010 • FAX: (603) 626-4642

EOTC #: MPA: 89-0005

The Commonwealth of Massachusetts
Executive Office of Transportation & Construction
Office of the Secretary
10 Park Plaza, Room 3510
Boston, MA 02116-3969

hael S. Dukakis
Governor
lerick P. Salvucci
Secretary
and
IBTA Chairman

( ) ENF (x) DRAFT E.I.R. ( ) FINAL E.I.R. No: 5671

SUBMITTING AGENCY: MASSACHUSETTS PORT AUTHORITY

PROJECT IDENTIFICATION: LOBSTER TERMINAL & WATERFRONT PARK, PIERS 4 & 5
BOSTON, MASSACHUSETTS

DATE RECEIVED BY E.O.T.C.: APRIL 25, 1989

GENERAL RECOMMENDATIONS & CONDITIONS:

Transmitted to Environmental Affairs.

Frederick P. Salvucci, Secretary
Executive Office of Transportation
and Construction.

Date: 7-10-89

LOBSTER TERMINAL AND WATERFRONT PARK
EAST BOSTON, MASSACHUSETTS

DRAFT ENVIRONMENTAL IMPACT REPORT
EOEA NO. 5671

July 10, 1989

Prepared for:

THE MASSACHUSETTS PORT AUTHORITY
Ten Park Plaza
Boston, MA 02116-3971

Prepared by:

HMM ASSOCIATES, INC.
Engineers, Environmental Consultants & Planners
196 Baker Avenue
Concord, Massachusetts 01742

This Draft Environmental Impact Report (EIR) for the Lobster Terminal and Waterfront Park project has been prepared for the Massachusetts Port Authority by HMM Associates, Inc. with assistance from:

- Tsoi/Kobus and Associates, Inc.: Architects, Land Planners and Program Coordinators
- Henderson Planning Group: Community and Economic Planners
- Hayden–Wegman, Inc.: Structural and Marine Engineering
- J.D. Koppernaes Engineering, Ltd.: Lobster Facility Designers
- Carol R. Johnson and Associates: Waterfront Park Designers
- Toxikon Corporation: Analytical Laboratory

This team, working under MPA Contract No. 5.036A, has provided expertise in a wide range of technical areas to design a lobster terminal and waterfront park on the East Boston Piers that meets community and lobstermen needs, site constraints and regulatory guidelines within the requirements imposed by the legislature. The submission of this Draft EIR represents a positive step towards implementation of improvements at the East Boston Piers.

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1–1

2.0 PROJECT SUMMARY 2–1
  2.1 Name of Project 2–1
  2.2 General Project Description 2–1
  2.3 Summary of Major Environmental Effects 2–5
    2.3.1 Tidelands 2–5
    2.3.2 Dredging/Filling 2–5
    2.3.3 Deep Berthing 2–5
    2.3.4 Navigation 2–6
    2.3.5 Traffic 2–6
  2.4 Summary of Mitigation Measures Proposed 2–8
    2.4.1 Tidelands 2–8
    2.4.2 Dredging/Filling 2–8
    2.4.3 Deep Berthing/Navigation 2–8
    2.4.4 Traffic 2–9
  2.5 State Identification Numbers 2–9
  2.6 Federal and State Permits Required 2–9

3.0 FUNDAMENTAL ISSUES 3–1
  3.1 Legislative Framework 3–1
  3.2 Public Review Process/Commitments to Use 3–3
  3.3 Segmentation 3–5

4.0 PROJECT DESCRIPTION 4–1
  4.1 Type of Project 4–1
    4.1.1 Lobster Terminal 4–1
    4.1.2 Waterfront Park 4–4
  4.2 Objectives of the Project 4–10

Page

4.3 Physical Characteristics of the Site and Surroundings 4-11
  4.3.1 The Site and Its Characteristics 4-11
  4.3.2 Coastal Context of the Site 4-15
  4.3.3 Abutting Land Uses 4-16
4.4 Construction Details 4-17

5.0 ANALYSIS OF EFFECTS 5-1
5.1 Dredging/Filling 5-1
  5.1.1 Proposed Filling/Dredging 5-1
  5.1.2 Sampling Methodology 5-1
  5.1.3 Sediment Quality 5-4
  5.1.4 Benthic Analysis of Fill Area 5-9
5.2 Deep Berthing/Navigation 5-16
  5.2.1 Trends in Deep Berthing 5-16
  5.2.2 Evaluation of Deep Berthing Potential on the East Boston Piers 5-19
  5.2.3 Flexibility of Proposed Alterations 5-20
  5.2.4 Navigation 5-20
5.3 Traffic 5-21
  5.3.1 Existing Study Area Characteristics 5-21
  5.3.2 Existing Conditions Transportation Analysis 5-23
  5.3.3 1992 No-Build Conditions Transportation Analysis 5-29
  5.3.4 1992 Build Conditions Transportation Analysis 5-35
  5.3.5 Parking and Circulation 5-39
  5.3.6 Traffic Impact Summary 5-44
  5.3.7 Mitigation Measures 5-47

6.0 TIDELANDS 6-1
6.1 Tideland Identification 6-1
  6.1.1 Extent and Type of Tidelands 6-2
6.2 Proposed Activities in Tideland Areas 6-4
6.3 Recognition of Chapter 91 Policies and Standards 6-7

TABLE OF CONTENTS (Continued)

Page

7.0 RESPONSES TO COMMENTS ON THE ENF 7-1
- 7.1 Comments from the DEQE Division of Wetlands and Waterways Regulations 7-2
- 7.2 Comments from the Office of Coastal Zone Management 7-8

8.0 MITIGATION MEASURES 8-1
- 8.1 Tidelands 8-1
- 8.2 Dredging/Filling 8-2
- 8.3 Deep Berthing/Navigation 8-2
- 8.4 Traffic 8-3

APPENDICES

APPENDIX A – SECRETARIAL DECISIONS
APPENDIX B – LEGISLATION
APPENDIX C – TECHNICAL STUDIES
APPENDIX D – CHAPTER 91 RESEARCH
APPENDIX E – SEDIMENT QUALITY DATA
APPENDIX F – BENTHIC ASSESSMENT DATA
APPENDIX G – TRAFFIC DATA

LIST OF FIGURES

Page

Figure 2-1 Site Location 2-2
Figure 2-2 Schematic Plan of Lobster Terminal 2-3
Figure 2-3 Schematic Plan of Waterfront Park 2-4
Figure 2-4 Comparative Traffic Volumes at Major Intersections 2-7

Figure 4-1 Existing Site Conditions 4-12

Figure 5.2-1 Location of Sediment Sampling Sites and Proposed Dredging and Fill Areas 5-2

Figure 5.3-1 Study Area Intersection Locations 5-22
Figure 5.3-2 Existing (1988) AM Peak Hour Volumes 5-24
Figure 5.3-3 Existing (1988) PM Peak Hour Volumes 5-25
Figure 5.3-4 No-Build (1992) AM Peak Hour Volumes 5-32
Figure 5.3-5 No-Build (1992) PM Peak Hour Volumes 5-33
Figure 5.3-6 Distribution of Project Trips from the Site 5-37
Figure 5.3-7 Distribution of Project Trips to the Site 5-38
Figure 5.3-8 Full Build (1992) AM Peak Hour Volumes 5-40
Figure 5.3-9 Full Build (1992) PM Peak Hour Volumes 5-41
Figure 5.3-10 Site Circulation 5-43

Figure 6-1 Location of Earliest Known Shoreline and Historic Extreme Low Water Line 6-5

LIST OF TABLES

Page

Table 4-1 Open Space Areas in Boston Neighborhoods, 1988 4-5
Table 4-2 Park Area/Person for Boston Neighborhoods, 1988 4-6
Table 4-3 Waterfront Parks in Boston Neighborhoods, 1988 4-8

Table 5.1-1 Classification of Dredge or Fill Material by Chemical Constituents 5-5
Table 5.1-2 Classification of Dredge or Fill Material by Physical Characteristics 5-6
Table 5.1-3 Normally Approvable Dredging, Handling, and Disposal Options 5-8
Table 5.1-4 Taxonomic Composition and Density of Benthic Organisms at the Sampling Stations 5-11

Table 5.2-1 Inventory of Deep Berthing Areas in Boston 5-18

Table 5.3-1 Level of Service (LOS) Designations 5-27
Table 5.3-2 1988 Existing Peak Hour Intersection Operations Summary 5-28
Table 5.3-3 Accident History 5-30
Table 5.3-4 1992 No-Build Peak Hour Intersection Operations Summary 5-34
Table 5.3-5 1992 Build Peak Hour Intersection Operations Summary 5-48
Table 5.3-6 Phase II Build Peak Hours Intersection Operations Summary 5-50

CIRCULATION LIST

No. of Copies	Address
3	Secretary of Environmental Affairs 100 Cambridge Street - 20th Floor Boston, MA 02202 ATTN: MEPA Unit, File No. 5671
1	Executive Office of Communities and Development State Clearinghouse 100 Cambridge Street 1404 Boston, MA 02202
1	Metropolitan Area Planning Council 110 Tremont Street Boston, MA 02108 ATTN: Lois Baxter
1	DEQE Division of Wetlands and Waterways One Winter Street - 7th Floor Boston, MA 02128 ATTN: John Simpson, Section Chief
1	DEQE Metropolitan Boston/Northeast Region Division of Wetlands and Waterways One Winter Street - 7th Floor Boston, MA 02128 ATTN: William Krol, Section Chief
1	DEQE Division of Water Pollution Control One Winter Street Boston, MA 02128 ATTN: Ms. Judy Perry
1	DEQE Metropolitan Boston/Northeast Regional Office Division of Water Pollution Control 5 Commonwealth Avenue Woburn, MA 01801 ATTN: Rich Chertien, Section Chief

CIRCULATION LIST (Continued)

No. of Copies	Address
1	Massachusetts Office of Coastal Zone Management 100 Cambridge Street - 20th Floor Boston, MA 02102 ATTN: Mr. Steve Bliven, Acting Director
1	Army Corps of Engineers New England Division 424 Trapelo Road Waltham, MA 02254-9149 ATTN: Karen Adams, Section Chief
1	U.S. Environmental Protection Agency WQE-1900 JFK Federal Building Boston, MA 02203
1	Boston Conservation Commission The Environmental Department One City Hall Square - Room 805 Boston, MA 02201 ATTN: Brian Glascock, Chairman
1	Boston Redevelopment Authority One City Hall Square - 9th Floor Boston, MA 02201 ATTN: John Leigh

SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

The Lobster Terminal and Waterfront Park project is proposed in response to a State legislative mandate (Chapter 349 of the Acts of 1986, found in Appendix B) to provide for development of facilities in the Boston Harbor for the lobster fishing industry, to provide a neighborhood park for the East Boston community, and to revitalize Massport's East Boston Piers property, which is in a state of extreme disrepair and deterioration.

The Lobster Terminal and Waterfront Park proposed for Piers 4 and 5 will provide direct public benefits to the City of Boston and to the region. Significant environmental impacts are limited to the dredging aspect of the project, with the dredge spoils anticipated to be creatively disposed of within the confines of the site.

The potential elimination of a deep water maritime use is assessed in this Draft EIR. The success of such a use is not only determined by the water depth but by the adequacy of land portions for storage; the availability of an adequate rail or transportation circulation system to move materials from the port; and compatibility with adjoining land uses. Except for the availability of deep water, none of these other criteria exist at the East Boston Piers.

Despite the difficulty of traffic access patterns to the site, the Lobster Terminal and Park are shown in this report to minimally affect traffic conditions. In addition, the seasonal nature of the Lobster Terminal's heaviest activity, the off-peak arrivals and departures of lobstermen, and the neighborhood focus of the Waterfront Park all significantly reduce the impacts described in this report's traffic engineering evaluation. As such, the proposed use is regarded most appropriate for this site.

The Lobster Terminal to be constructed on 3.5 acres, including Pier 5 and associated backland, will provide permanent docking and accessory uses for up to 44 lobstermen vessels. The Waterfront Park, utilizing the existing core of Pier 4 and approximately six acres of backland, will provide a first-class, passive waterfront recreation use to positively serve the open space needs of the adjacent East Boston community. Its proximity to the lobster terminal will enhance the park's attraction by providing the opportunity for the public to view the operation of this unique waterfront industry. The Park's design will be flexible enough to provide for future additional waterfront amenities. As proposed, the project meets and exceeds the Chapter 91 standards for work in tidelands with regard to water-dependent uses, public benefits, and public access. The proposed uses are also consistent with policies of the Coastal Zone Management program.

The issue of segmentation pertaining to future development of the Phase II portion of the East Boston Piers (Pier 1 and its associated backland) was raised by reviewers during the scoping. At the time the ENF for this project was prepared, only the general options for the Phase II project were known. Since that time, a consultant team has been selected by Massport; a preliminary analysis of alternative use programs is now underway with Massport and the East Boston Project Advisory Committee. Any future development on that site must include the currently proposed Lobster Terminal and Waterfront Park in the assessment of ambient environmental conditions. No intention of segmenting the development of Piers 4 and 5 from 1 and 3 to avoid MEPA review exists. Each project will undergo full MEPA review in its turn. Finally, neither the Lobster Pier nor Waterfront Park use will constrain development possibilities or options for the redevelopment of the Phase II portion of the total site.

The project described by this Draft EIR has been long in the planning stage and has been reviewed extensively with the local community and with City and State agencies involved in review of waterfront development. As important, however, has been the coordination with representatives of the Boston Harbor Lobstermen Association and with independent lobstermen operating in the Boston Harbor. While there remain questions as to the appropriate balance of lobstermen served on the East Boston Piers versus total demand within Boston Harbor, and to the final design of the Lobster Pier and Waterfront Park, all who have reviewed the plans to date have been supportive of the undeniably remarkable recovery that will occur on the East Boston Piers as a result of the proposed project.

Massport is confident that this environmental review process will result in the implementation of a successful project in a timely completion manner, providing new uses for the rehabilitated East Boston Piers.

SECTION 2.0
PROJECT SUMMARY

2.0 PROJECT SUMMARY

This section provides a brief overview of the relevant project characteristics, impacts, and mitigation discussed in more detail elsewhere in this Draft EIR. Information regarding the regulatory needs of the project on a federal and state level is also provided in order to identify issues within MEPA jurisdiction. In general, the proposed project meets regulatory requirements, providing significant benefits while minimally impacting the environment.

2.1 Name of Project

The project known as the Lobster Terminal and Waterfront Park involves the demolition, renovation, and reconstruction of Piers 4 and 5 along with the improvement of associated headland areas to develop a Lobster Terminal and a Waterfront Park in East Boston, Massachusetts (Figure 2-1).

2.2 General Project Description

The proposed project is comprised of two separate elements, both legislatively funded under the same Act. The design of these elements is the result of an extensive public review process involving community and lobstering representatives as well as state agency input.

The Lobster Terminal will be constructed on 3.5 acres including Pier 5 and associated backland. The facility (Figure 2-2) will provide dockage and operations space for 44 lobstermen. For each of the 44 boats accommodated there will be provided a slip, a 1,500 square foot work area and trap storage area and 2 parking spaces. The individual work areas will be utilized for trap storage during both summer and winter seasons and for work space required for trap maintenance. In addition, each work area will include one of the designated parking spaces and a shed for equipment storage. A shared work area will also be provided for larger repairs and some winter boat storage.

The Waterfront Park (Figure 2-3) will utilize the existing core of Pier 4 and approximately six acres of backland area. The community has expressed the desire for a passive recreation area focused on the waterfront. The park will provide this type of facility, to be maintained by the MDC. Elements of the park include tot lots, picnic tables and grills, a fitness station, an amphitheater centered on Pier 4 and a decked promenade along the Pier itself.

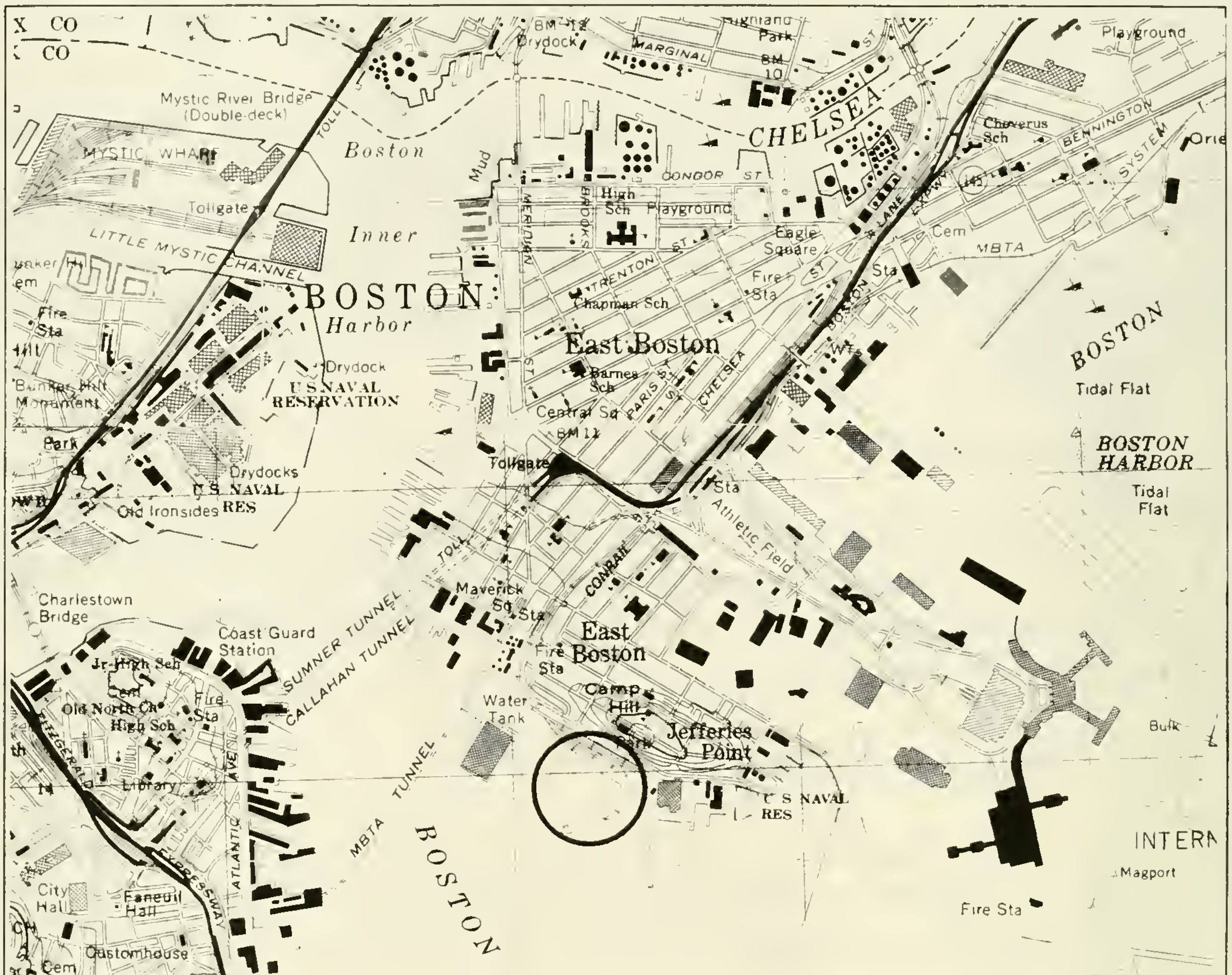
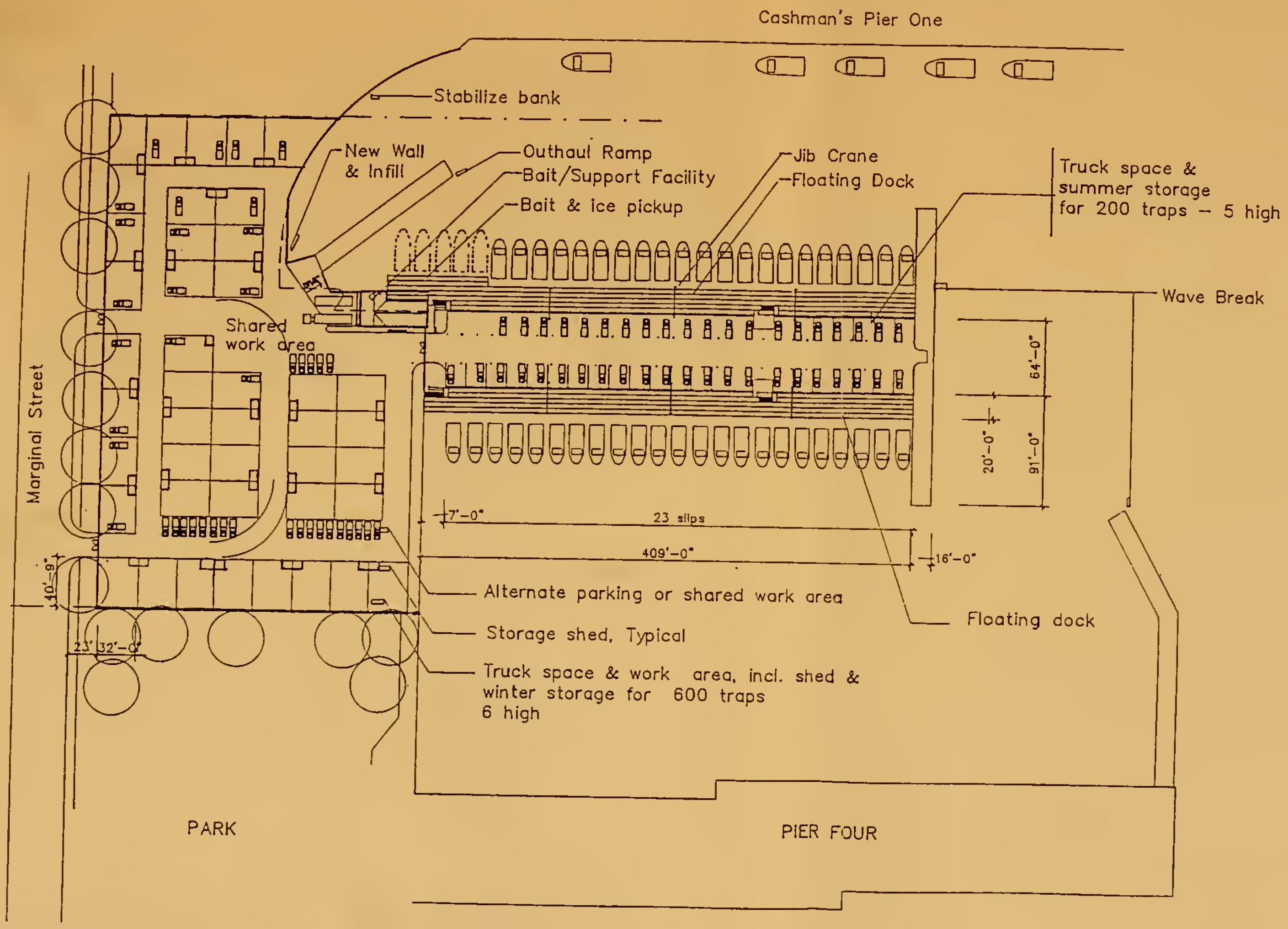


FIGURE 2–1
SITE LOCATION



Features:

44	slips
44	work areas (1500 sf) incl. trap storage & work space
2	parking spaces
1	shed
1200 sf	public toilet facilities bait/ice house

Tsoi/Kobus & Associates, Inc.
Architects

FIGURE 2-2
SCHEMATIC PLAN OF LOBSTER TERMINAL

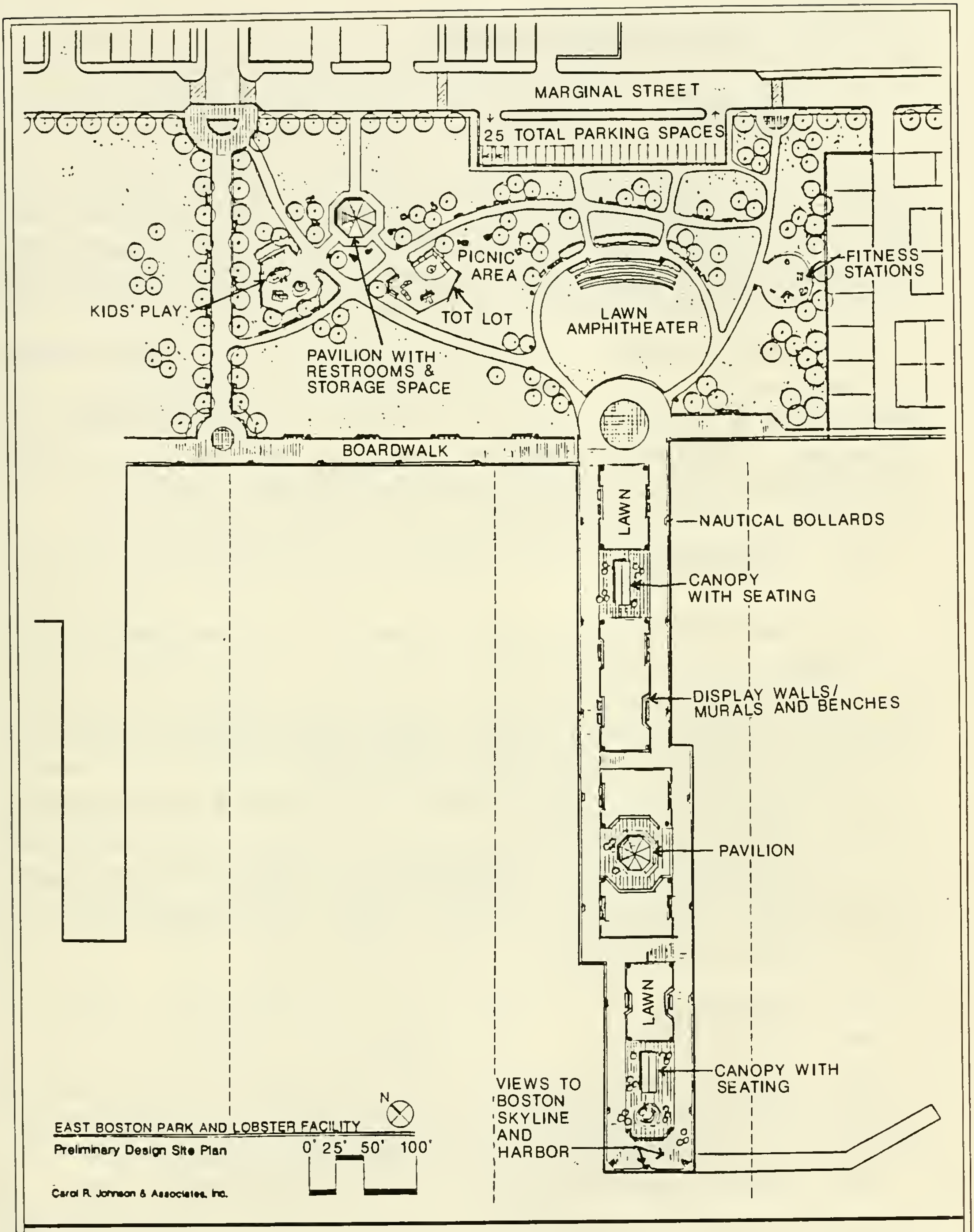

MARGINAL STREET
25 TOTAL PARKING SPACES
FITNESS STATIONS
PICNIC AREA
KIDS' PLAY
TOT LOT
LAWN AMPHITHEATER
PAVILION WITH RESTROOMS & STORAGE SPACE
BOARDWALK
LAWN
NAUTICAL BOLLARDS
CANOPY WITH SEATING
DISPLAY WALLS/ MURALS AND BENCHES
PAVILION
LAWN
CANOPY WITH SEATING
VIEWS TO BOSTON SKYLINE AND HARBOR
N
EAST BOSTON PARK AND LOBSTER FACILITY
Preliminary Design Site Plan
0' 25' 50' 100'
Carol R. Johnson & Associates, Inc.

FIGURE 2–3

SCHEMATIC PLAN OF WATERFRONT PARK

2.3 Summary of Major Environmental Effects

2.3.1 Tidelands

The Lobster Terminal and Waterfront Park backland area is subject to the provisions of Chapter 91 as stated in Section 7 of Chapter 349 of the Acts of 1986. Based upon a detailed historical investigation, it has been determined that the Lobster Terminal and Waterfront Park backland area consists entirely of former private tidelands; a small portion of Pier 4 extends beyond the historic extreme low water line.

Both the proposed lobster terminal and the proposed waterfront public park are water-dependent uses and are, therefore, appropriate for this waterfront site. All proposed work on the site was designed to comply with the current policies and requirements established by DEQE for water-dependent uses. The proposed water-dependent uses are an appropriate use of the waterfront.

2.3.2 Dredging/Filling

Some dredge and fill activity will be associated with the proposed Lobster Facility. It is proposed to place 22,000 cubic yards of fill behind sheet piling to stabilize, but not substantially change, the shape of the existing shoreline. Dredging will be required alongside the proposed new Pier 5 to achieve low water depths of 15 feet. It is estimated that 12,000 cubic yards of dredge material will be removed.

Both sediment quality and benthic assessments were performed to identify potential constraints. No rare or endangered species were encountered in the project area. Samples from the proposed dredge areas indicated a low diversity of benthic organisms and a high level of contamination. It is not expected that the dredging and filling proposed will significantly alter the character of the project area.

2.3.3 Deep Berthing

Water depths at the East Boston Piers site potentially may support deep water berthing uses. Furthermore, because such deep water areas are limited in Boston Harbor, the appropriateness of the proposed use for this site is addressed in this Draft EIR.

The theoretical needs of a commercial martime facility include a minimum low water depth of 35 feet, a large backland storage area, and an adequate transportation network access. Only one of these criteria, however, is met at the East Boston Piers.

Vehicular and truck access to the site is constrained, both due to the narrowness and the residential character of the neighboring roads. The rail line on the project site has been unused and abandoned for many years. Although the right-of-way is intact, the tracks are in disrepair, and would need a large capital investment to make them usable.

The State Legislature has defined the lobster industry as an important public interest that should be supported through the development of a lobster terminal. Studies have shown that this site is the most appropriate site available for this lobster terminal construction. Additionally, this proposed use will not constrain future development on Piers 1 and 3 (Phase II). Therefore, the Lobster Terminal and Waterfront Park project is appropriate for this site.

2.3.4 Navigation

Water traffic is proposed solely for the Lobster Terminal portion of the project. No physical obstacles exist in this area of Boston Harbor. Also, the physical constraints due to boat traffic patterns in the area have been reviewed. The lobster fleet can operate safely at this site, with no navigational conflict.

2.3.5 Traffic

A concern outlined in the Secretary of Environmental Affairs' Certificate is the potential impact of new traffic associated with the Lobster Terminal and Waterfront Park upon the operation of the surrounding roadways. Accordingly, potential project impacts upon traffic were examined to ensure that the Lobster Terminal and Waterfront Park will not adversely effect traffic operations in the surrounding neighborhood.

Analysis of the future Build conditions shows that the Lobster Terminal and Waterfront Park has little or no effect on the operational capacity of intersections in the site vicinity. Under this Build condition, only two intersections, those of Maverick Street with Meridian Street at Maverick Square and Maverick Street at Orleans Street, decrease in level of service due to the proposed project. At neither intersection do operations decline lower than an acceptable LOS "D". Figure 2-4 compares the relative volume of existing traffic to the traffic contribution of this and other recent projects to illustrate the minor impact of the Lobster Terminal and Waterfront Park on the roadway network.

The project-generated traffic, therefore, will not significantly affect the surrounding area.

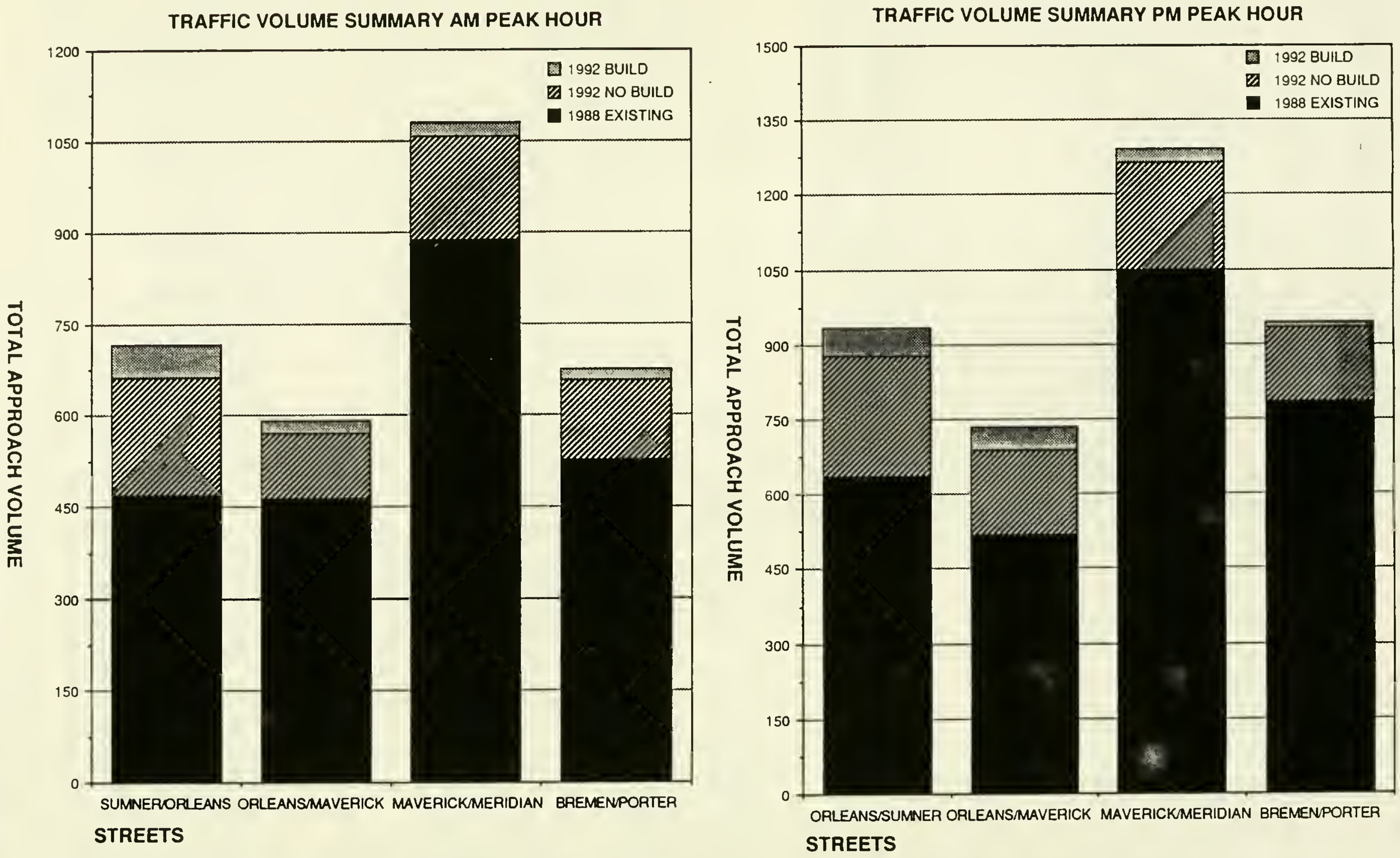


FIGURE 2–4

COMPARATIVE TRAFFIC VOLUMES AT MAJOR INTERSECTIONS

2.4 Summary of Mitigation Measures Proposed

2.4.1 Tidelands

The standards required to be met under the Chapter 91 program have been established to ensure that projects in tideland or former tideland areas do not in any way impair the public's rights in those areas. By compliance with those requirements, any potential adverse impact to tidelands is mitigated. The uses proposed for this site are an appropriate for a waterfront site. The project as a whole represents the type of mitigation generally required for such tidelands areas; there is no part of this project that does not enhance the public's use of tidelands.

Additionally, the project has been designed in a manner that contemplates new uses for Phase II on the East Boston piers. This provides an opportunity to further enhance water-related amenities in the future.

2.4.2 Dredging/Filling

The proposed filling will not adversely affect the environment; therefore, no mitigation is proposed.

Dredging will be performed in such a manner as to minimize sediment disturbance. Additionally, no dredging will occur during the winter flounder season. Disposal of the dredge material is proposed to occur on the project site, encapsulated as a portion of the required fill material. This will ensure that the disposal of contaminated sediments will not result in the degradation in quality of any additional site. The disposal will be accomplished under the direction of DEQE, with appropriate safeguards to eliminate the possibility of exposure to site users.

2.4.3 Deep Berthing/Navigation

The proposed use of the site will not require mitigation in these areas.

2.4.4 Traffic

Due to the size and nature of the proposed project, the traffic impacts associated with it will be minimal. Under the proposed Build condition, the intersection of Maverick Street at Maverick Square will be operating at a less acceptable Level of Service "D". The minimal number of trips associated with this project do not warrant mitigation. Other projects in the MEPA process, Clippership Wharf and Boston Marine Works, have identified this location for signalization. Such mitigation would greatly improve the operation of this intersection.

2.5 State Identification Numbers

- Executive Office of Environmental Affairs - The EOEA number assigned to this project is 5671.

- Department of Environmental Quality Engineering Division of Water Pollution Control - No DWPC numbers have been assigned at this time.

- Department of Environmental Quality Engineering Wetlands Division - No DEQE/Wetlands Division numbers have been assigned at this time.

- Massachusetts Office of Coastal Zone Management - No MCZM file numbers have been assigned at this time.

2.6 Federal and State Permits Required

Federal

- U.S. Army Corps of Engineers - Section 10 and Section 404 permits will be required for construction within a navigable waterway and for any placement of fill in wetland areas. This work includes the construction of a relocated Pier 5 to provide docking space for the Lobster Terminal.

- NPDES - This permit will be required in the event a direct point source discharge is proposed into the harbor. It is not expected that this will be required for the Lobster Terminal and Park project.

State

- o Massachusetts Environmental Policy Act (MEPA) – Based upon the information contained in an Environmental Notification Form (ENF), the Secretary of Environmental Affairs determined that an Environmental Impact Report (EIR) was required. Accordingly, this Draft EIR has been prepared to respond to the concerns outlined in the Secretary's Scope.

  Once the availability of this report has been published in the Environmental Monitor, a 30–day public comment period will begin. At the end of those 30 days, the Secretary will utilize all comments received to make a decision within seven days regarding the extent to which environmental impacts are adequately addressed in this report.

  If necessary, a Final EIR will then be prepared in response to any comments on the Draft EIR; it will undergo the same review and decision periods as previously described. State permits, which are dependent upon approval of the Final EIR, could be issued 60 days after its availability. State agencies will utilize the information represented in this Draft EIR and in the Final EIR to make their Section 61 determinations regarding appropriate mitigation of the project's adverse environmental effects.

- o Massachusetts Department of Environmental Quality Engineering

  - Division of Water Pollution Control – A Water Quality Certification will be required for the Section 10 and Section 404 filings. This will ensure that disturbance within the water area will not result in adverse water quality impacts.

  - Division of Water Pollution Control – A Sewer Extension/Connection Permit will be required in order to service the site.

- Division of Wetlands and Waterways Regulation - Legislation for this project requires that the provisions of Chapter 91 be observed. The major issues relating to this program are addressed in this Draft EIR.

- Division of Wetlands and Waterways Regulation - A Notice of Intent must be filed with the Boston Conservation Commission for work proposed in or within 100 feet of wetland resources.

SECTION 3.0
FUNDAMENTAL ISSUES

3.0 FUNDAMENTAL ISSUES

This section is in response to the requirements of the Secretary's Certificate on the ENF. In addition to outlining environmental and regulatory issues related to development of the Lobster Terminal and Park project, MEPA identified several issues requiring special understanding in order to assess the appropriate development of this project.

3.1 Legislative Framework

The project described in this Draft EIR has been proposed in response to State legislation enacted on July 23, 1986 (Appendix B). The intent of the legislation was to provide a waterfront park on the East Boston Piers and to site a lobster terminal in an appropriate available location in Boston Harbor. The proposed lobster facility will constitute a much needed maritime use and a stable base for a valuable component of Boston's fishing industry. The total project cost for the waterfront park and lobster terminal project has been established by legislature at approximately $20 million, with funds to be provided by the Commonwealth of Massachusetts.

As required by the legislation, following the completion of the MEPA process, a feasibility report to the legislature will be prepared by HMM Associates, Inc. in conjunction with a project team consisting of the Henderson Planning Group, J.D. Koppernaes Engineering, Ltd., Carol R. Johnson and Associates, Tsoi/Kobus and Associates, Inc., and Hayden-Wegman, Inc. This Feasibility Study, as described in the following section, will be the result of both technical analyses and public input. Topics to be addressed in this report include:

- A discussion of the lobster industry, including a market analysis and an evaluation of industry program needs.

- Alternative sites around Boston Harbor that would be appropriate for lobster terminal construction are analyzed. The analysis includes utilization of the Harbor Data Bank compiled by Boston Harbor Associates with approximately 260 sites. The study is based upon the assumption that approximately 80 boats could be housed at one site. This assumption was disputed by the lobster industry, hence the reduction in the program presented in this Environmental Impact Statement. After initial screening, 543 sites remained to further screen for use and ownership. A third screening resulted in six publicly owned sites including the East Boston Piers, MBTA Power Plant site (South Boston), Old Boston East Site (East Boston), 826 Border Street (East Boston), Old Navy Fuel Pier (East Boston), and 300 Condor Street (East Boston). The final screening left the East Boston Piers, MBTA Power Plant and Old Boston East. (See Appendix C for draft of Analysis of Alternative Sites which will appear in the Legislative Feasibility Report and correspondence from the MBTA in regards to the MBTA Power Plant site in South Boston.) The East Boston Piers became the preferred site and the one recommended for a new Boston Harbor lobster terminal.

- A review of existing conditions at the East Boston Piers (Piers 4 and 5 along with their backland areas). This analysis will focus on engineering and environmental constraints, including site access and transportation issues.

- A detailed description of the proposed lobster facility including program requirements, as well as the extent of engineering work necessary. Based upon the preferred scheme, site design costs and a 10-year financial operation analysis will be included in order to document the long-term operational needs and establish appropriate rental fee ranges.

- A similarly detailed description of the waterfront park's program, cost and financial situation.

- An implementation schedule for the proposed work.

The information for this legislative report is in the process of being developed; available information has been utilized, as appropriate, for this Draft EIR. The level of detail required for presentation to the Legislature will ensure that these above concerns are carefully documented, in addition to undergoing several levels of public review, prior to submission and legislative approval. The proposed scheme outlined in this Draft EIR, therefore, will meet a high level of environmental standards and provide documented public purpose.

3.2 Public Review Process/Commitments to Use

Besides defining the level of analysis required for the legislative report, the State legislation also outlines a specific public review process. This involves continued input by the East Boston Project Advisory Committee and the convening of a project Advisory Board. In addition to these legislative requirements, Massport has regularly met with representatives from the Boston Harbor Lobster industry. The level of review by each of these groups in described below.

East Boston Project Advisory Committee

The East Boston Project Advisory Committee (PAC) was formed in 1981 when Massport entered into an agreement with the BRA concerning planning for development and improvement of the Massport-owned East Boston Piers. In this agreement, the BRA took responsibility for planning activities. As the first step in the planning process, the BRA formed the East Boston PAC, comprised of 18 people.

When the process of formulating a development plan began, the PAC met approximately every other week. Following adoption of by-laws, development of an operational structure and election of officers, the PAC focused on reviewing available site information, establishing preliminary pier development goals, and reviewing potential land uses.

In 1986, coordination of the design process was taken over by Massport. In response to legislation enacted in 1985, Massport contracted with a multi-disciplinary team of consultants to work with the PAC and other advisory boards to schematically design an implementable Lobster Terminal and Park on the East Boston Piers.

The PAC meets on the third Tuesday evening of every month to receive progress reports and provide input for project design. These regular meetings have ensured community participation and steady progress towards implementation of this project.

Advisory Board

Under the legislation, Massport and the Metropolitan District Commission (MDC) were required to convene an 8-member Advisory Board for this project. Members of this Advisory Board are:

- The Executive Director of Massport
- The Commissioner of the MDC
- The Commissioner of Department of Environmental Quality Engineering (DEQE)
- The Director of the Boston Redevelopment Authority (BRA)
- The President of the Boston Harbor Lobstermen's Cooperative
- A Representative of the PAC
- Two Residents of Marginal Street in East Boston

Meetings have been held with the Advisory Board at stages in the design process requiring decisions and approvals. Feedback from this board currently provides planning and design assistance. Upon completion of Lobster Terminal and Waterfront Park construction, the Advisory Board will be maintained to provide consultation to Massport and the MDC regarding the operation of these facilities.

Lobstering Industry Representatives

Representatives from the lobstering industry have been encouraged to attend PAC meetings and the president of the Boston Harbor Lobstermen's Cooperative is on the Advisory Board. In addition to these forums for review and discussion, a series of meetings has been held to specifically discuss lobstering issues and the design and location of the proposed Lobster Terminal. Lobstermen from the Cooperative have been primarily represented at these meetings by their president, Mr. Alex Ferent. Additional independent lobstermen from the East Boston area have attended these meetings, as have others with an interest in the lobstering industry.

Through these meetings, the lobstermen have expressed their needs to the project design team and have commented upon continually revised schemes, thus working to ensure that the designed facility will meet their needs in the most appropriate fashion.

3.3 Segmentation

The MEPA regulations preclude the segmentation of projects for the purpose of avoiding MEPA review and of pre-empting options for the use of the site. The definition of "segmentation" in the current MEPA regulations provides guidelines to determine whether components of the same project are actually one project or can be considered as two. Issues to consider include the interval between phasing, the commonality of the schemes, and the separability of the environmental impacts of each component.

The issue of segmentation has arisen in the context of the Piers development project out of two distinct sets of concerns: 1) that by engaging in separate environmental reviews of its two sequential phases, the disclosure and mitigation of the cumulative impacts of the development of the Piers would be avoided; and 2) that by dealing with the site in two phases, the consideration of a major maritime terminal requiring the utilization of the entire site would be precluded. Both of these aspects of segmentation are discussed below.

Avoidance of MEPA Review

The East Boston Piers site is viewed as a single project with two separate development phases, identified as Phase I and Phase II. The legislation (Chapter 349 of the Acts of 1986) which calls for the Phase I program of uses -- namely the Park and the Lobster Terminal -- recognizes the fact of a multi-phase project. All parties involved in the legislation and the implementation of the Phase I project recognized that a development program for Phase I was expedited to meet the needs of the lobster industry in Boston Harbor. The needs of the lobster industry were sufficiently compelling to call for the environmental review of Phase I, prior to the resolution of the program for Phase II.

The fact that site development has been staged in two phases does not detract from the fact that the Piers are a single development entity. There are several interconnections between Phase 1 and Phase 2 developments. For example, the lobstermen will move from their current locations on Piers 1 and 3 to the terminal built for them on Pier 5 as part of the Phase I development. Indeed Chapter 349, which laid out many of the terms of the Phase I project components contemplates a related Phase II to complete the development of the Piers property. The overall development goals and guidelines for the site will be applied to the programs for each phase, and the East Boston PAC will be involved throughout the decision-making process for each phase.

Massport's designated developer for Phase II will undertake another full Environmental Process for the Phase II portion of the project. At that time, the Phase I program will be incorporated as part of the background conditions for analysis in evaluating the impacts of Phase II. There is no expectation of avoidance of MEPA review for the east Boston Piers project.

Appropriateness of Maritime Uses

The question of segmentation also arose out of the expressed concern that a future maritime terminal would be precluded by the proposed Phase I use program because the entire Piers 1 - 5 site may be needed to satisfy the land requirements of such a facility. The issue of future maritime use at the Piers was discussed as long as thirteen years ago in the Master Plan of 1976. At that time, Massport adopted a policy that stated that because of changes in the industry and because of the neighborhood setting of the Piers property, the siting of a major maritime terminal at Piers 1 -5 was no longer considered an acceptable or compatible use. Deep water not withstanding, the lack of adequate transportation, the proximity of a dense residential neighborhood, the limits on the available backland, and the substantial capital costs required to reinstitute even the limited rail access to the site, all supported that conclusion. Therefore, the decision to preclude a major maritime facility at the Piers site - at lest for the foreseeable future - predates the decision to proceed with a phased development of this site, and of the decision to file an ENF for Phase I.

Discussion

At the time the ENF was prepared for Phase I development, only the general physical requirements for the Lobster Terminal and Park project were known. One of the assumptions was that development of the Lobster Terminal and Waterfront Park would occur on Piers 3 and 5, leaving an area of undeveloped land separating the two portions of the project. This undeveloped land, plus Piers 1 and 4 and their associated backland, was proposed for future development of the East Boston Piers.

The current proposal for use of Piers 4 and 5 provides a significantly more cohesive design and a more workable phasing plan. The Boston Marine Works project abuts the project site to the east, defining that edge. The location of the Lobster Terminal and Waterfront Park as adjacent uses provides an opportunity to visually link the two, thereby further enhancing public use of the waterfront.

Further, these two components have been united in the legislation authorizing funds for their construction. Due to this financial relationship, the close physical proximity of the sites and the combined consideration this project is receiving from the public and agenices through the on-going review process, the Lobster Terminal and Waterfront Park is appropriately considered as one project in this Draft EIR.

The remaining undeveloped area of pier and backland, associated with Piers 1 and 3, is currently under investigation to determine an appropriate use program. A team of consultants for this Phase II effort has been chosen by Massport to review technical information and work with the pre-established public review process to eventually result in a developer's kit requesting proposals for Phase II. At this time, specific plans have not been finalized and the MEPA review process has not been started by filing an ENF. The proposed Lobster Terminal and Waterfront Park project must comply with the MEPA process prior to legislative approval. Since the need for a permanent location for the Boston Harbor lobstering industry is becoming more urgent over time, this Draft EIR has been submitted prior to resolution of the program on the Phase II site. Because the Phase II project is anticipated to be proposed by a private developer and will potentially be of different character, the impacts of the Phase II portion of the East Boston Piers are not addressed in this Draft EIR. Any future development on that site must include the currently proposed Lobster Terminal and Waterfront Park in the assessment of ambient environmental conditions. Conversely, the proposed Lobster Terminal and Waterfront Park project has been carefully designed to enhance, not to constrain, the options for use of Piers 1 and 3.

SECTION 4.0
PROJECT DESCRIPTION

4.0 PROJECT DESCRIPTION

This section provides a more detailed description of project elements and objectives. In addition, a general description of site conditions identifies the need for improvement regardless of the proposed use. An outline of the construction needs and schedule is also provided.

4.1 Type of Project

The two elements of the proposed project are included together in Legislation allocating funds for their construction. In addition, the waterfront park has been designed to complement the adjacent lobstering operation. Characteristics of the two project components are described below.

4.1.1 Lobster Terminal

Context of the Proposed Lobster Terminal

The Boston Harbor lobstering industry is an important element of Massachusetts' economy and of its character. As the demand and the accompanying price for waterfront property increases, the lobstering community is faced with limited berthing area availability and rapidly escalating rents. In response to this public concern, State legislation has been enacted to provide lobstermen a place to berth at reasonable cost. In addition, the State legislation established a public process through which to define a "state-of-the-art" facility to meet the needs of the lobstering industry. The lobster terminal element of the project as proposed in this Draft EIR has been developed through this public process to meet present and future lobster industry needs in the most appropriate fashion. A consultant team comprised of experts with technical ability in lobster facility design, structural and marine engineering, economic feasibility, and land planning were assembled by Massport to determine project feasibility.

The needs of the lobstermen in Boston Harbor have been examined in some detail; a program of the requirements was established to meet these needs, which is described in the following sections.

The identification of alternative sites in regard to locating a lobster terminal in Boston Harbor included utilization of the Harbor Data Bank compiled by Boston Harbor Associates with approximately 260 sites. After initial screening, 54 sites remained to be further screened for use and ownership. A third screening resulted in six publicly owned sites including the East Boston Piers, MBTA Power Plant site (South Boston), Old Boston East Site (East Boston), 826 Border Street (East Boston), Old Navy Fuel Pier (East Boston) and 300 Condor Street (East Boston). The final screening left the East Boston Piers, MBTA Power Plant and Old Boston East. The other three sites were eliminated from further review because of such causes as insufficient dry upland area, significant on-site environmental problems and incompatible nearby uses (see Appendix C for draft of Analysis of Alternative Sites for the Legislative Feasibility Report and correspondence from the MBTA power plant site in South Boston).

The East Boston Piers became the preferred site and the one recommended for a new Boston Harbor lobster terminal.

Program Elements

The proposed Lobster Terminal (see Figure 2-2), by providing a designated area for the Boston Harbor lobstermen, will secure the future of Boston's lobstering industry. The facility will provide dockage and operational space for up to 44 lobstermen.

The needs of the lobster facility were based on discussions with lobstermen operating in Boston Harbor. The dockage requirements were estimated at between 70 and 90 slips for original study purposes based on these discussions. Because of the size of the selected site and the operational requirements carefully analyzed with the lobstermen, it was determined that the most feasible facility from an operational standpoint works best with approximately 40-50 slips.

The project will involve the demolition of the existing Pier 5; the deteriorated condition of this timber pile structure with timber decking will not safely support any future use. Following demolition, a new pile-supported structure will be constructed in its place. It is this reconstructed Pier 5 and the backland area associated with it that comprises the Lobster Terminal site. Improvements required for the backland area include some fill behind sheet pilings to improve the bulkhead along the waterfront.

Program elements that will be provided for tenants at the site include:

- Berthing space for 44 boats.
- Individual storage sheds associated with each work area; these will be utilized for storage of spare parts and supplies.
- A 1,500 square foot work and storage area. This space is provided in 2 locations. On the pier, one truck space and room for 200 traps is available for each of the 44 slips. This will adequately serve trap storage needs for the active summer season. An additional area per slip is provided on the back land parcel. Each work area in this location has been designed to accommodate an additional parking space, the storage shed and the storage of 600 traps through the inactive winter months.
- Additional working space on the floating dock along the new Pier 5.
- A bait and ice house, also including space for a meeting room, lounge and toilets.
- Docking space for loading of bait and ice to the boats.
- An outhaul ramp for boat removal.
- A wave break system designed to prevent the wave action from the inner harbor from disrupting the boats at the lobster terminal.

During the winter months, which for many lobstermen are non-operational, additional trap storage and repair space is required. Since the work and parking demand is greatly decreased, the project as proposed provides adequately for this need. In the winter, traps can be comfortably stored on the site.

Holding Facility

One of the important elements considered for this site during the design process was a holding facility, a structure equipped with holding tanks and storage areas to maintain lobsters at a low risk of mortality. Such a facility would purchase catch from both local lobstermen and from other areas, such as Maine or Nova Scotia.

Several of these facilities, however, currently exist around Boston Harbor. For this reason, construction of a holding facility on the Lobster Terminal site has been eliminated.

4.1.2 Waterfront Park

Context of the Proposed Waterfront Park

Boston currently has 5,873 acres of open space within its 18 neighborhoods. Many of these areas are utilized to improve the quality of urban life by providing open areas for passive or active recreation in the city. Total open space for the city amounts to 9.8 acres per 1,000 people; however, much of this space is not useful for recreational purposes due to inaccessibility or to lack of area maintenance. When considering only the open space areas classified as parks, the figure drops to 7.3 acres per 1,000 people. Table 4-1 lists the acreage available within each neighborhood, and for Boston as a whole, for different categories of open space.

In the neighborhood of East Boston, the amount of open space available at first seems large. In a ranking of Boston's 18 neighborhoods by open space area per capita, East Boston comes in sixth, with 23.6 acres per 1,000 residents. This ranking, however, reflects only the potential for usable recreational areas in the neighborhood. In fact, most of the area is classified as urban wilds, is inaccesible or is not maintained. Table 4-2 shows that East Boston ranks tenth in park area per capita, with 2.8 acres per 1,000 people, less than one-third the national ratio, and significantly less than that of Boston as a whole.

TABLE 4-1

OPEN SPACE AREAS IN BOSTON NEIGHBORHOODS, 1988

(Acres)

(Source: Boston's Open Space Plan)

Neighborhood	Parks/ Beaches	Squares/ Malls	School	Wilds	Garden	Cemetery	TOTAL
Allston/Brighton	250.67	0.95	12.6	56.71	1.64	14.29	336.86
Back Bay/ Beacon Hill	106.08	10.21	–	–	–	3.27	119.56
Charlestown	53.62	2.39	1.94	11.08	0.43	2.18	89.71
Chinatown	1.37	0.06	0.19	–	–	–	1.62
Downtown	2.07	14.51	–	–	–	0.67	17.25
EAST BOSTON	**92.44**	**5.86**	**13.07**	**663.58**	**0.26**	**3.62**	**778.83**
Fenway/Kenmore	255.40	1.20	6.87	–	32.44	–	295.91
Hyde Park	641.79	0.15	8.61	135.42	–	44.2	830.17
Jamaica Plain	566.39	0.42	19.29	157.55	1.82	–	745.47
Mattapan	80.11	–	18.53	114.47	–	–	213.11
N. Dorchester	68.97	0.61	4.87	101.81	0.53	3.27	180.06
North End	13.99	1.7	0.38	–	–	2.04	18.11
Roslindale	196.79	0.02	6.6	150.44	0.47	0.8	355.12
Roxbury	563.34	1.41	56.64	15.59	1.2	0.79	638.97
South Boston	171.28	0.79	11.09	–	–	0.38	183.54
S. Dorchester	202.61	1.64	28.09	157.91	1.78	2.19	394.02
South End	27.97	5.69	4.4	0	3.43	1.48	42.78
West Roxbury	110.11	0.05	14.31	538.47	0	0.9	663.84
TOTAL BOSTON	3,405.00	47.66	207.48	2,103.03	44.00	80.08	5,904.93

TABLE 4-2

PARK AREA/PERSON FOR BOSTON NEIGHBORHOODS, 1988

Neighborhood	Park Area (Acres)	Population	Park Area Per 1,000 Residents (Acres)	Rank
Allston/Brighton	250.67	68,413	3.7	7
Back Bay/Beacon Hill	106.08	31,552	3.4	8
Central*	17.43	24,924	0.7	14
Charlestown	53.62	13,441	4.0	6
EAST BOSTON	**92.44**	**32,956**	**2.8**	**10**
Fenway/Kenmore	255.40	42,320	6.0	4
Hyde Park	641.79	32,612	19.7	1
Jamaica Plain	566.39	44,401	12.8	2
Mattapan	80.11	40,395	2.0	12
N. Dorchester	68.97	26,005	2.7	11
Roslindale	196.79	32,873	6.0	4
Roxbury	563.34	58,475	9.6	3
South Boston	171.28	30,079	5.7	5
S. Dorchester	202.61	60,373	3.4	8
South End	24.01	25,372	0.9	13
West Roxbury	110.11	34,703	3.2	9
ALL BOSTON NEIGHBORHOODS	2,725.68	601,095	4.5	

---

* Central includes: Downtown, North End, and Chinatown.

Waterfront parks are important recreational areas in the City of Boston. Many parks are located on riverbanks, reservoirs and along the harbor shore. Approximately 27.3% of the parks in Boston are on waterfront, for a total of 1.49 acres of waterfront parkland per 1,000 people. East Boston ranks quite low in waterfront park areas. Table 4-3 lists the neighborhoods and ranks them in terms of waterfront park areas per 1,000 people. Even though East Boston has a large waterfront, it ranks 12th out of the 13 neighborhoods that have waterfront parks. Most of the East Boston waterfront is separate from the neighborhood due to its size or inaccessibility.

There is a very large waterfront in East Boston, but very little of this area is used for recreational purposes. Much of the waterfront open space is isolated from the neighborhoods by Logan Airport; most of that remaining is not within a neighborhood context and is more appropriate for use on a city-wide scale. Also, this East Boston neighborhood suffered the loss of significant park area when Olmstead's Wood Island Park was developed as an extension of Runway 15-33 in the late 1960's by MASSPORT for Logan Airport. The addition of a park in conjunction with the Massport Lobster Terminal on a scale promoting neighborhood use is an excellent way to address some of the open space needs of East Boston.

Program Elements

The proposed Waterfront Park (see Figure 2-3) is approximately 6 acres in size, consisting of a 5-acre backland parcel fronting the harbor and an adjoining 1.4-acre pier. The backland portion of the park extends from Marginal Street to the harbor's edge and, in an east/west direction, from the proposed Lobster Terminal site to approximately the centerline of Massport's existing Pier 3. The pier portion of the park consists of the central core area of existing Pier 4. The deteriorated apron and piles surrounding the Pier 4 core will be demolished and removed, thus leaving the walled core for use as part of the park.

The backland park is intended to be an informal, family-oriented greenspace providing passive recreational opportunities such as picnicking, strolling, sitting, sun-bathing, informal play, and viewing of the harbor. No formal sports fields or courts are proposed for the park since these facilities are, or are planned to be, provided elsewhere in the community; the windiness of this site makes such activities inappropriate.

TABLE 4–3

WATERFRONT PARKS IN BOSTON NEIGHBORHOODS, 1988

(Source: Boston's Open Space Plan)

Neighborhood	Park Area (Acres)	Waterfront* Parks (Acres)	Percent of Total	Waterfront Park Per 1,000 Residents (Acres)	Rank
Allston/Brighton	250.67	137.8	60.0	2.01	7
Back Bay/ Beacon Hill	106.08	29.4	27.7	0.93	9
Central**	17.43	11.21	64.3	0.45	10
Charlestown	53.62	42.04	78.4	3.13	2
EAST BOSTON	**92.44**	**10.67**	**11.5**	**0.32**	**12**
Fenway/Kenmore	255.40	113.19	44.3	2.67	4
Hyde Park	641.79	90.3	14.1	2.77	3
Jamaica Plain	566.39	208.22	36.8	4.69	1
Mattapan	80.11	6.7	8.4	0.17	13
N. Dorchester	68.97	56.29	81.6	2.16	6
Roslindale	196.79	0	0	0	14
Roxbury	563.64	0	0	0	14
South Boston	171.28	58.8	34.3	2.32	5
S. Dorchester	202.61	115.1	56.8	1.91	8
South End	24.01	0	0	0	14
West Roxbury	110.11	14.9	13.5	.43	11
ALL BOSTON NEIGHBORHOODS	2,725.68	894.62	32.8	1.49	

---

* Includes parks on the harborfront, rivers and reservoirs.

** Central includes Downtown, North End, and Chinatown neighborhoods.

Pedestrian access to the park will be via two major entry points: one at the intersection of Cottage and Marginal Streets, and one at the northeast corner of the park to accommodate visitors coming down the "Golden Stairs" from Webster Street. Although it is expected that most pedestrians will arrive at the Cottage Street entry, crosswalks across Marginal Street, special paving, ornamental plantings, and signage will be provided at both entry points.

Vehicular access to the park and the adjacent lobster facility will be from Marginal Street. Approximately 25 parking spaces will be located along the roadway at the back edge of the park to serve those driving to the park from other neighborhoods as well as visitors who might not be able to walk to the park.

Since the park is to be oriented toward the harbor, the walkway from the main Cottage Street entry is planned to lead directly to a proposed boardwalk promenade, forming the park's edge along the water. Connecting the park entries with the pier, other tree-lined pathways will meander through the grassy park and contribute to the informal character of the design. Ample seating throughout the park will be provided by benches located along the edges of the pathways and the boardwalk promenade; these benches will be oriented toward the water and the view of Boston's skyline. Light fixtures with a nautical or historical character will also be located regularly along the paths and at the park entries to encourage safe use of the park on warm nights.

The only building in the backland park will be a pavilion containing public restrooms, drinking fountains, open air picnic space, and storage for park maintenance gear. Located near the street for ease of service and surveillance, the pavilion will be located adjacent to the park's two play areas which serve tots and older children in separate lots. A small spray pool is proposed in conjunction with the tot lot for younger children. Benches and shade trees are planned around the play areas to give parents a pleasant place from which to watch the activity. Picnic tables and grills are to be located among the trees around the pavilion and in groups throughout the back half of the park.

An outdoor amphitheater and a "fitness station" are the final two features proposed within the backland park. The fitness station consists of a variety of exercise stations with programs for young and old alike. A portion of the station will be devoted to exercises for the handicapped. Bounded by curving pathways, the grass amphitheater will be centered on a paved area at the head of the pier where small-scale cultural events and other community affairs may be held. At the back of the amphitheater, several large seating steps will give structure to the amphitheater while providing additional places to sit. Since the amphitheater area will be graded as a "dish", it could be flooded and frozen in winter for informal skating.

The promenade along the park's edge will continue around the perimeter of the pier, linking the backland and pier areas of the park. In addition to being a pleasant place to fish, sun, stroll, or sit by the water, the redeveloped pier is also intended to become an "outdoor classroom" for children and adults displaying various aspects of East Boston's rich and colorful heritage. This could include maritime history focusing on the famous shipbuilder, Donald McKay; the evolution of the East Boston piers themselves and related shipping; and the history of immigration into the country through the gateway of East Boston. Historical themes would be developed over time through the use of murals, sculpture, full-scale maritime "artifacts", plaques, monuments, and other interpretive features.

The pier surface would consist of the perimeter promenade and several large grass panels separated by paved walkways and small plazas. The appearance of the pier will change in the years to come as historical features are incorporated into the pier. At the small plazas, several open air pavilions are planned to provide shaded seating and to act as focal points for historical displays, sculpture, and planters with annual flowers. To maximize seating possibilities, additional benches are located along the entire inboard edge of the promenade. The lighting of the backland park would be extended to the end of the pier to make nighttime use possible for the entire park. Tree planting or extensive shrub beds on the pier will be avoided due to the difficulty expected with maintaining these plants in such an extreme environment.

4.2 Objectives of the Project

Legislative monies have been allocated for this project to serve a public purpose. With waterfront property increasingly in demand, rental prices for land and harbor areas rise accordingly. If current trends continue, lobstering in Boston Harbor will shortly become financially infeasible. The construction of a Lobster Terminal on the East Boston Piers will provide an affordable alternative for up to 44 lobstermen. Participation of lobstermen throughout the design process ensures that the proposed facility will meet lobster industry needs in the most appropriate fashion.

The proposed Waterfront Park is a well-deserved amenity for the East Boston community. Design in collaboration with the community and state agencies has resulted in a proposal which will both meet community needs and utilize a waterfront area to increase and enhance public waterfront use.

4.3 Physical Characteristics of the Site and Surroundings

4.3.1 The Site and Its Characteristics

The Lobster Terminal and Waterfront Park are located in East Boston on Piers 4 and 5, and a portion of the Pier 3 backland. The property is bounded on the northeast side by Marginal Street. On the southeast, the site is bounded by the Boston Marine Works and its Pier No. 1. To the southwest is Boston's Inner Harbor and shipping channel. For the purposes of describing the site, the waterside boundary is considered to be the State Harbor Line.

The backland area, bordered by Piers No. 3, 4, and 5 to the south and Marginal Street on the north, is nearly level. Marginal Street is elevated about 6 feet above the general backland elevation. The area is overgrown with a secondary growth of bushes and grasses, and the site has been used for random dumping. Piles of debris are located throughout the site.

At one time, the backlands contained a railroad yard, a large grain elevator, grain conveyors, a seven-story brick warehouse, a machine shop, and a water tower. All of these structures have been demolished, although some of the foundations remain.

Shoreline

The shoreline between Pier No. 5 and Boston Marine Works' Pier No. 1 consists of a stone bulkhead wall and small areas of a rubble strewn slope. A pile supported timber deck extends from the front of this wall. These piles and decking are in deteriorated condition and do not have any live load capacity. Dry rot and extensive marine borer activity have caused severe damage. The deck planking is very unstable. The stone retaining wall appears to be in fairly stable condition with no crumbling or erosion evident along its length.

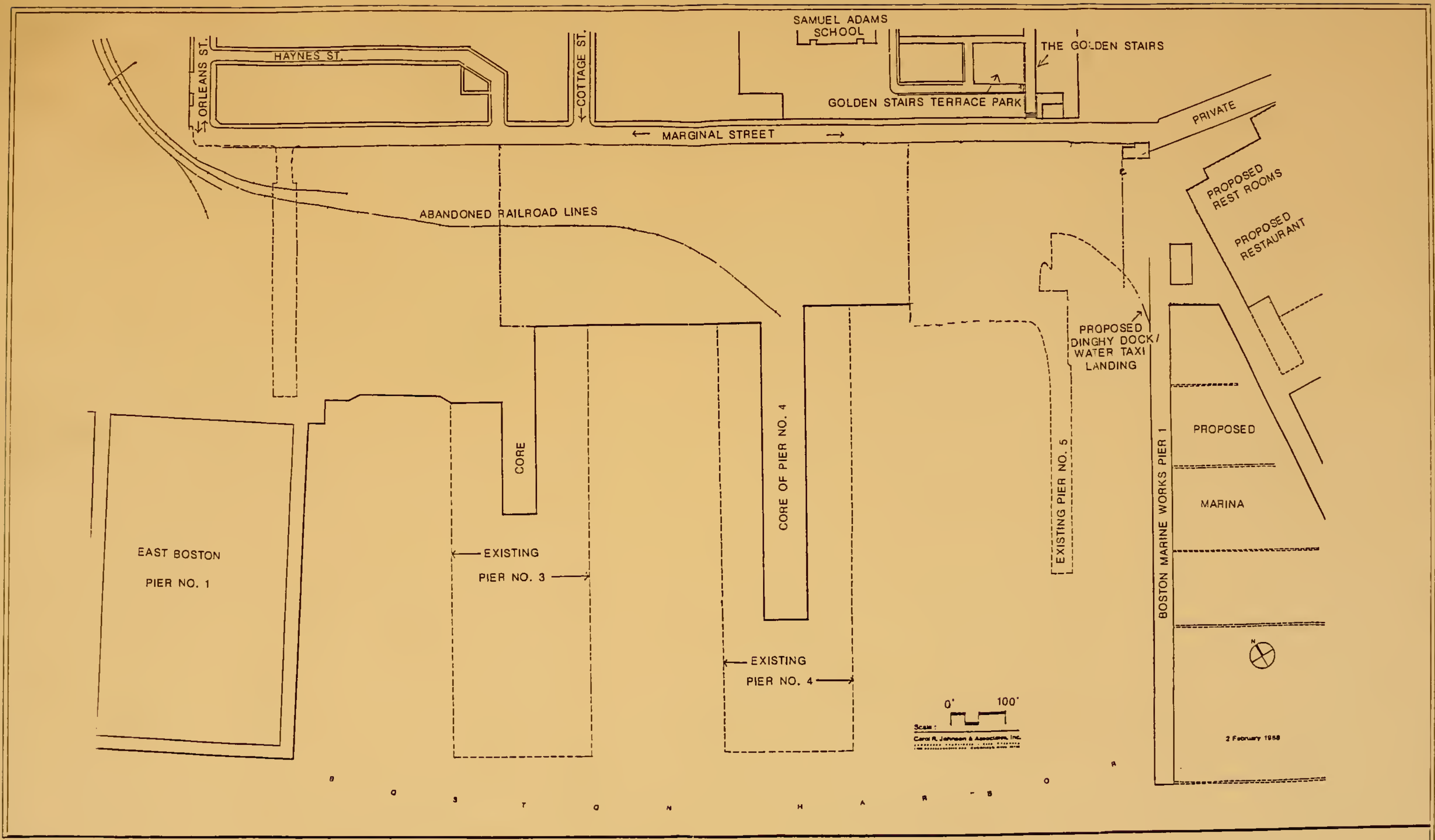


FIGURE 4–1
EXISTING SITE CONDITIONS

Between Piers No. 5 and 4, the shoreline exists as a fairly stable slope. Dumping of rubble and construction debris has taken place in this area. In front of Pier No. 4, the shoreline has been eroded away. The erosion has begun to undermine the existing concrete retaining wall at the base of Pier No. 4. Spalling and cracking of the wall is evident, and the wall is unstable.

A bulkhead between Piers No. 4 and 3 consists of granite blocks with a bituminous asphalt concrete surfaced, timber pile supported timber deck. The piles and decking are in good condition. Under the deck are the remains of concrete footings that were probably used to support the former grain storage elevators at the site. Some marine borer activity is present. However, there has been no apparent decrease in the load bearing capacity of the structure due to borers or dry rot. The asphalt cover on the timber decking may conceal damage caused by water passing through the asphalt. The granite wall is in generally good condition with no missing or crumbling blocks. A riprap slope protects the base of the wall.

Pier 4

Pier No. 4 is primarily a timber structure composed of timber piles, cross bracing and decking over a solid fill core retained by granite stone and concrete. The pier is approximately 780 feet long by 245 feet wide. The solid filled core occupies about one-third of the pier area; the decking is in an advanced state of decay. Approximately 80% of the piles are 8 inches in diameter or less as a result of heavy marine borer activity. The fasteners in the cross-bracing are extensively corroded and missing in some places. The timber portions of the pier are unsafe to carry any live load. The perimeter of the deck, consisting mainly of a concrete slab as well as supporting stringers and pile caps, is in very poor condition. Much of the concrete is spalled and cracked, with exposed reinforcing bars. The center of the pier, constructed on solid fill, has various retaining walls and concrete decks which are in fair condition.

The solid fill portion of the pier is in good condition. It consists of a riprap slope around the entire perimeter from 0 to 5 feet above the Mean Low Water elevation. The core is retained by a granite block wall which runs along the east side. Most of the west wall consists of a 10-foot high concrete wall. The concrete wall appears to be in generally good condition on the outer surface with little cracking or exposed reinforcing. Some undermining of the wall is present in local areas; there is also some corrosion of tieback fasteners and steel bracing. The concrete wall contains large, 6-foot by 6-foot, pyramid shaped concrete abutments spaced approximately 20 feet on center along its length. These abutments, acting mainly as footings for the former loads applied on this structure, are bearing on somewhat eroded concrete pile caps. A small percentage of the timber piles beneath these caps are exposed and show some rot above MLW. Because of these irregularities and doubts regarding the load capabilities of this wall, the amount of rehabilitiation work needed is uncertain.

The granite block wall encompassing the majority of the pier core appears generally intact. A 20- to 30-foot section of the east wall has collapsed. The upper row of block under some timber piles supporting the deck is crumbling.

Pier 5

Pier No. 5, constructed of timber, is supported on timber piles. It measures approximately 500 feet long by 40 feet wide. A bituminous asphalt concrete overlay covers most of the timber decking. The pier was once equipped with a gantry crane to unload shipping. Remains of the crane rails in the decking are corroded and bent with segments missing. Approximately 50 percent of the piles are 8 inches in diameter or less as the result of heavy marine borer attack. The deck structure is severely rotted and, in some places, completely burned out. The bracing fasteners are severely corroded. However, some newer piles at the perimeter of the pier are in good condition. Deposits along the pier have accumulated so that at low tide, the harbor bottom is exposed up to 3 feet for a distance of about 20 feet along the length of the pier.

The original design capacity of the piles is estimated to be 20 tons. Because of the extensive deterioration, however, Pier No. 5 does not have any existing live load capacity.

4.3.2 Coastal Context of the Site

The proposed Lobster Terminal and Park are located on the Boston Inner Harbor within 1,000 feet of the port of Boston's main shipping channel. The facility's proximity to the channel is significant from two standpoints. First, there is ready access from the site to the channel and the surrounding navigable deep waters of the inner harbor. Second, this distance between the site and the channel provides for a large separation zone within which smaller craft can safely operate and not conflict with the movements of larger vessels. Few other sites on Boston Inner Harbor can offer as sufficient a buffer zone between ship traffic and landside facilities. Therefore, there is little potential for lobstering operations to impact or be impacted by the large vessels in the main ship channel. More information on navigational issues is contained in Section 6.3 (Compliance with Chapter 91 Policies and Standards) and Section 5.2.4 (Navigation).

Although water depths at the site range to approximately 30 feet, its proximity to the neighboring Jeffries Point residential area, as well as its limited roadway access via a single residential street severely constrains the site's landside support potential for significant deepwater port development. The site constraints related to deep berthing uses are discussed in detail in Section 5.2.2.

All of the land on-site is previously filled private tideland, with the shorefront structurally bulkheaded with granite, concrete, and wood. Consequently, the "Coastal Bank" (the bulkheaded shorefront), the "Land Subject to Coastal Storm Flowage", and the "Land Under the Ocean" (seaward of the bulkheads) are the only physical coastal resource areas at the site which are protected by the Coastal Regulations promulgated under the Massachusetts Wetlands Protection Act.

Prevailing winds at the site are onshore, approaching the site from a westerly direction across the waters of the inner harbor. Onshore winds most frequently blow from the south-southwest to west-northwest. Offshore winds from the east to northeast quadrants have a higher average velocity, but shorter duration; moreover, the site is protected from these winds by existing land forms. The average wind speed from all directions is 13 miles an hour.

Reference to the NOAA, National Ocean Service (NOS) tide tables indicates that the mean tidal range at Boston Harbor is approximately 9.5 feet, and the spring tide range is 11.0 feet. The mean highwater elevation is 4.87 feet (NGVD), and the spring high tide elevation is 5.91 feet (NGVD). Actual storm wave impacts have minimal effect on the

Lobster Terminal and Park site due to the site's geographic location, limited exposure to storm waves, orientation to storm generated waves, and the beneficial effect of existing piers, and berthed vessels in reducing wave impacts. While the site is potentially vulnerable to wind generated waves from the southeast, the winds above 20 mph which are necessary to generate storm waves from this direction are seasonal and not statistically significant. Stillwater tide heights associated with coastal storm surges reach elevations of 10.3 feet (NGVD) during events of 100 year frequency and 10.0 feet (NGVD) during events of 50 year frequency. Tidal currents flood to the northwest at 0.7± knots and ebb to the southeast at 0.8± knots.

Due to the level of commercial craft activity operating within the 1,000-foot zone between the site and the main shipping channel, the site is exposed to wave "agitation". This consists of generally low amplitude surface motions of varying periods created by reflected and diffracted wave patterns from various sources including: remnants of ocean swell, vessel movements and locally generated waves and their interactions. Locally generated wind waves and ocean swells are not a potential cause of wave damage at this site due to the site's geographic location. The site is protected from direct effects of regional storm winds from the north, northwest, west, and southwest by existing land, buildings, piers, and other structures. The site is further protected from wave impacts in other directions due to a combination of factors including: angular spreading, shoaling, and limitations of effective fetch (0.50 to 2.75 miles) for generating waves. Studies done for the Boston Marine Works, the adjacent site at approximately the same distance from the shipping channel, concluded the wake effect due to vessels in the shipping channel would be insignificant.*

4.3.3 Abutting Land Uses

To the southwest, the East Boston Piers are abutted by the Boston Marine Works site; this, in turn, is abutted by Boston Harbor. Directly behind the site, to the northeast, is the Jeffries Point neighborhood. The neighborhood is a tightly knit, older residential neighborhood. The buildings are a mix of brick and frame structures built in the nineteenth century. Typically, the housing is two- and three-story buildings with a mix of single-family and multi-family uses. While the neighborhood is older, there are obvious signs of scattered renovation and remodelling as many residents have taken advantage of their views of the Boston skyline by constructing decks and installing picture windows.

---

* HMM Associates, Inc., The Boston Marine Works FEIR, January 1988.

At slightly greater distances from the site are Logan Airport and the rest of East Boston. The airport, which is less than half a mile distant, lies to the northeast and east. The remainder of East Boston is to the north. The Maverick Square area of East Boston, with its mixed commercial uses and an MBTA Blue Line Station, lies one-third of a mile to the north.

4.4 Construction Details

The Lobster Terminal and Park will involve the complete demolition of Pier 5, and the demolition of Pier 4 down to its solid fill core. The core of Pier 4 will be rehabilitated and used for the Waterfront Park. A new pile-supported Pier 5 will be constructed to serve the needs of the Lobster Terminal.

A shoreline retaining wall will be constructed between Pier 4 and the new Pier 5, as well as between Pier 5 and the Boston Marine Works' Pier 1; in addition, the existing bulkhead wall of the crescent-shaped opening between Pier 5 and Boston Marine Works will be rehabilitated. This will involve the placement of fill to restore the shore to a regular surface.

Also included in the waterside construction will be the floating decks and fender system associated with wave protection and pier access. Dredging of approximately 6,000 cubic yards on each side of the new Pier 5 will be required to restore adequate water depths (15 feet) for lobstering vessel circulation.

Landside construction will be minimal. The majority of improvements required for the Waterfront Park involve landscaping elements. The Lobster Terminal includes the construction of one building. Paving material will be utilized for the remainder of the site. Engineering details can be found in Appendix C.

Following approval of the Feasibility Study by the Legislature, Massport will select a design team to produce construction drawings and bid documents for this project.

SECTION 5.0
ANALYSIS OF EFFECTS

5.0 ANALYSIS OF EFFECTS

This section provides an analysis of the potential impacts of the proposed project regarding dredge and fill activities, limitations imposed on deep berthing and navigation in the site vicinity, and traffic operations. In summary, the only significant impact due to the Lobster Terminal and Waterfront Park project is the need for disposal of contaminated dredge materials. By creatively confining the sediments on-site, this concern is effectively mitigated.

5.1 Dredging/Filling

5.1.1 Proposed Filling/Dredging

Dredging will be performed on either side of the proposed Pier 5 to provide a minimum 15-foot depth at mean low water. It is expected that approximately 12,000 cubic yards of material will be dredged; the areas of proposed dredging are shown in Figure 5.1-1.

The shoreline located between the existing Pier 5 and the Boston Marine Works Pier No. 1 is retained by a granite block wall. Extending out from this wall is a badly deteriorated timber deck supported on timber piles. The timber deck and piles will be removed and fill will be placed behind a new sheet pile retaining wall to make a straight shoreline edge. The shoreline edge between Piers 4 and 5 will also be improved. This will involve approximately 22,000 cubic yards of fill. Modifications to the shoreline will be coordinated with the adjacent Boston Marine Works project to prevent possible planning conflicts.

5.1.2 Sampling Methodology

Sediment samples were collected to determine the chemical composition and benthic organisms in the areas to be dredged or filled in association with shoreline straightening. A total of 17 sites were sampled around Piers 4 and 5. Figure 5.1-1 shows the approximate locales of sample sites.

Two sets of "grabs" were taken at each of the 17 sampling locations. One set was used for bulk sediment and priority pollutant testing; the other was retained for benthic analysis. A modified 0.04 square meter VanVeen Grab was used to collect the samples. The grab was dropped at each sampling location and the sediment was apportioned to

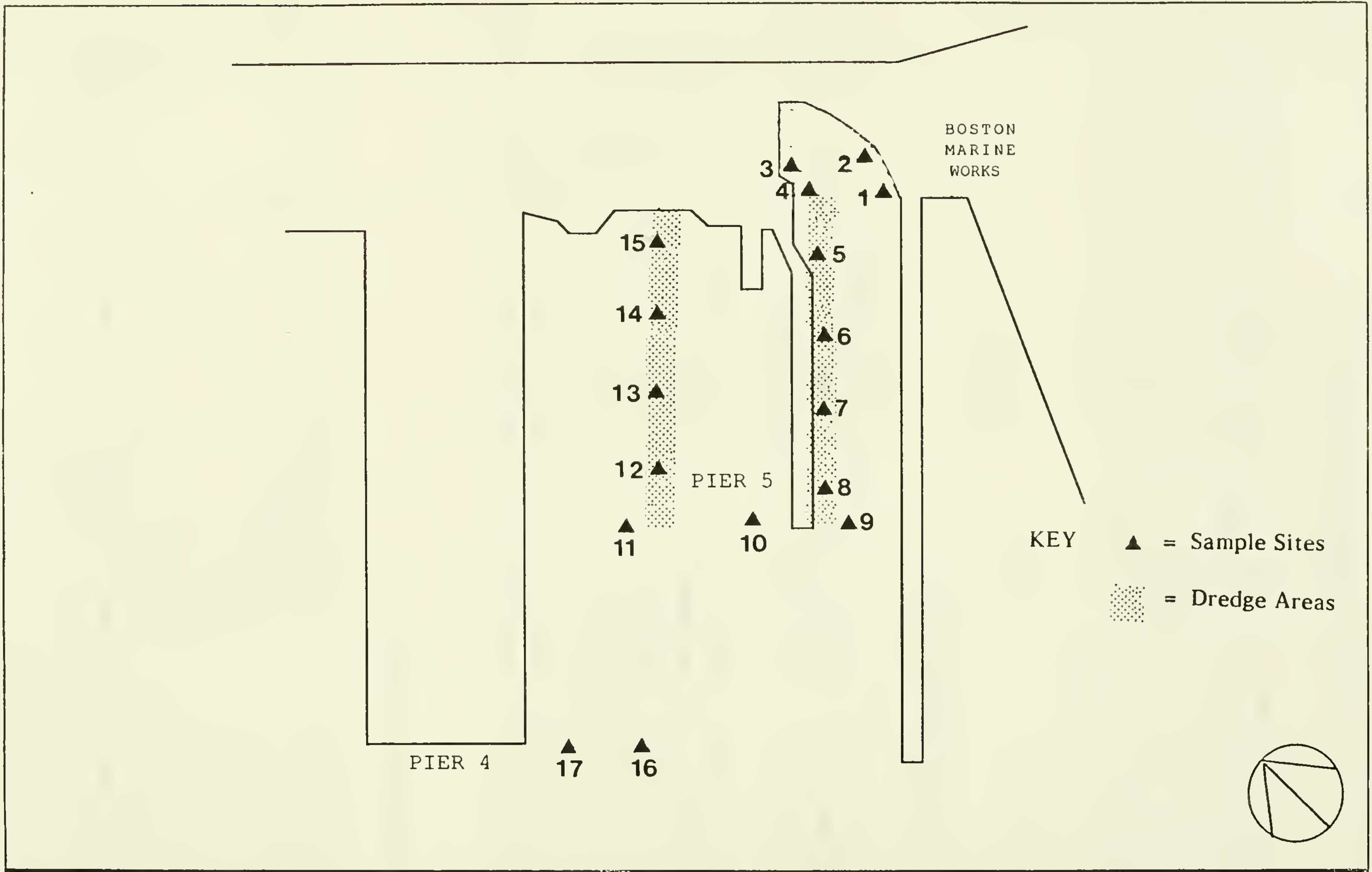


FIGURE 5.1–1
LOCATION OF SEDIMENT SAMPLING SITES AND
PROPOSED DREDGING AND FILL AREAS

separate glass jars for the bulk sediment analysis and the priority pollutant testing. The jars were placed in a cooler to keep the samples cold. All of the samples were taken to the lab within 12 hours for testing.

A total of five samples were sent to the lab for analysis. Each sample was a composite from several sample sites. Samples A through E were taken from the following locations:

Sample A	Sample Sites 1–5*
Sample B	Sample Sites 6–9
Sample C	Sample Sites 10–12
Sample D	Sample Sites 13–15
Sample E	Sample Sites 16–17

The bulk sediment and priority pollutant tests were conducted by Toxikon Labs. Toxikon followed standard Army Corps of Engineers testing procedures for the bulk sediment testing. The bulk sediment samples were tested for:

- volatile solids
- percent moisture
- oil and grease
- Hg, Pb, Zn, As, Cd, Cr, Cu, Ni
- PCB's

The priority pollutant sediment samples were tested using standard EPA testing procedures. These samples were tested for:

- volatile organic carbon
- acid base neutral extractibles
- 13 priority pollutant metals
- total cyanide and sulfide

---

* The sediment collected from sample site No. 3 was collected in three separate grabs since enough material could not be collected in one or two grabs.

A separate benthic sample was taken at each of the 17 sample sites. As in the case of the sediment quality samples, this sampling was done with a 0.04 square meter modified Van Veen Grab. Each sample was washed with salt water through a 1.0 mm sieve. The organisms caught in the sieve were placed in plastic jars and preserved with isopropyl alcohol. The number and types of organisms were identified. As previously mentioned, a full grab could not be obtained for sample site No. 3; a composite of three grabs was used for the benthic analysis at this sampling site.

5.1.3 Sediment Quality

The DEQE Division of Water Pollution Control regulates dredging and filling under 314 CMR 9.03, which establishes a system for classifying dredge or fill materials by chemical constituents and physical characteristics. Tables 5.1-1 and 5.1-2 provide a framework for determining sediment quality. These tables have been taken from the regulations and are provided as background for a discussion of the classification of sediment from the proposed dredge and fill areas.

Based on the lab test results, the characteristics of the sediment of the three areas proposed to be potentially filled or dredged are described below. A certificate of analysis from Toxikon Labs is included in Appendix E for all tests conducted on the samples.

The characteristics of Sample A provide information regarding sediment quality in proximity to an area to be filled by the shoreline improvements. Except for mercury, Sample A showed relatively high levels of all metals that were tested for in the Bulk Sediment Test. It is likely that most of the pollutants were from Sample No. 1 and Sample No. 5 because the finer sediments making up these samples retain contaminants rather than flushing them out. The other three samples (Nos. 2, 3, and 4) seem representative of most of the area adjacent to the existing bulkhead and exhibited coarser sandy sediment comprised of outwashed fill from the decaying bulkhead. These samples had the largest number and variety of organisms, as will be discussed later.

Sample B is composed of sediment taken at four sampling sites on the northeastern side of the existing Pier 5; therefore, this sample is representative of the sediments proposed to be dredged along the side of the pier. According to Bulk Sediment Tests, Sample B contains very high levels of oil and grease (6%). Under the present regulations, any dredge or fill material containing greater than 1.0 % oil and grease is classified as a

TABLE 5.1-1

CLASSIFICATION OF DREDGE OR FILL MATERIAL BY CHEMICAL CONSTITUENTS*

(All units are in parts per million.)

	Category One	Category Two	Category Three
Arsenic (As)	less than 10	10 – 20	greater than 20
Cadmium (Cd)	less than 5	5 – 10	greater than 10
Chromium (Cr)	less than 100	100 – 300	greater than 300
Copper (Cu)	less than 200	200 – 400	greater than 400
Lead (Pb)	less than 100	100 – 200	greater than 200
Mercury (Hg)	less than 0.5	0.5 – 1.5	greater than 1.5
Nickel (Ni)	less than 50	50 – 100	greater than 100
Polychlorinated Biphenyls (PCB)	less than 0.5	0.5 – 1.0	greater than 1.0
Vanadium (V)	less than 75	75 – 125	greater than 125
Zinc (Zn)	less than 200	200 – 400	greater than 400

Category One materials are those which contain no chemicals listed in Table 5.2-1 in concentrations exceeding those listed in the first column.

Category Two materials are those which contain any one or more of the chemicals listed in Table 5.2-1 in the concentration range shown in the second column.

Category Three materials are those materials which contain any chemical listed in Table 5.2-1 in a concentration greater than shown in the third column.

Other important man-induced chemicals or compounds not included in Table 5.2-1 which are known or suspected to be in the sediments at the dredge site will of course be given weight in the classification of the material and the choice of dredging and disposal methods. When the Division has reason to suspect the presence of any other toxins due to a nearby discharge, additional testing for that element may be required.

---

* Table I from 314 CMR 9.03.

TABLE 5.1–2

CLASSIFICATION OF DREDGE OR FILL MATERIAL BY PHYSICAL CHARACTERISTICS*

	Type A	Type B	Type C
Percent Silt–Clay	less than 60	60 – 90	greater than 90
Percent Water	less than 40	40 – 60	greater than 60
Percent Volatile Solids (NED Methods)	less than 5	5 – 10	greater than 10
Percent Oil and Greases (Hexane Extract)	less than 0.5	0.5 – 1.0	greater than 1.0

Type A materials are those materials which contain no substances listed in Table 5.2–2 exceeding the amounts indicated in the first column.

Type B materials are those materials which contain any one or more of the substances listed in Table 5.2–2 in the concentration range shown in the second column.

Type C materials are those materials which contain any substance listed in Table 5.2–2 in a concentration greater than shown in the third column.

When the Division has reason to suspect that biological contaminants are present (for example, because of the physical parameters), additional testing may be required.

---

* Table I from 314 CMR 9.03.

Type C sediment. These regulations also require that Sample B sediments be classified as Category Three, based on its chemical constituents (in particular, the high levels of arsenic, copper, lead and zinc).

Composite Sample C, with two sample sites at the outer extent of the proposed dredge area between Piers 4 and 5, has metal contaminant levels well below the concentration found in Sample D. The chemical constituents indicate that Sample C falls under Category One and its physical characteristics indicate a Type C sediment.

Sample D is composed of all the samples taken from the proposed dredging area between Piers 4 and 5, with the exception of sample site No. 12. The tests for sediment in this area indicate metal contamination. In classifying material by physical characteristics, a Type C sediment is one in which the percent water exceeds 60. Therefore, Sample D is a Type C sediment, with a percent moisture of 68. This sample is further classified as a Category Three based on its chemical constituents (the high levels of lead detected).

Sample E is composed of sediment taken at sampling sites 16 and 17, the area of proposed wave fence construction next to Pier 4. Bulk sediment analysis revealed high levels of metals. Thus, this sample is classified as Category Three material due mainly to the chromium, lead, and zinc levels detected. This sample can be further categorized as a Type C sediment because the percentages of water, volatile solids, and oil and greases exceeded the values for Type C materials set forth in 314 CMR 9.03.

Overall, the sediments from the proposed dredge areas are classified as Category Three and Type C materials. Consultation with the DEQE is needed to confirm the assumptions made to classify these sediments. A final determination about the sediment quality will be made by the DEQE Division of Water Pollution Control.

Dredging and Disposal Options

The techniques for dredging, disposal, and types of disposal sites can be determined based on the chemical and physical characteristics discussed above. Table 5.1-3 indicates the approvable dredging, handling, and disposal options. Testing of the sediments from the proposed dredge area revealed high levels of contaminants. Due to these contaminant levels, this material was classified as Category Three and Type C sediment.

TABLE 5.1–3
NORMALLY APPROVABLE DREDGING, HANDLING, AND DISPOSAL OPTIONS*

CHEMICAL TYPE	Category One			Category Two			Category Three		
PHYSICAL TYPE	A	B	C	A	B	C	A	B	C
Dredging Methods									
Hydraulic	X	X	X	X	X	X	X	X	X
Mechanical	X	X	X	X	X	X	X	X	X
Disposal Methods									
Hydraulic: Sidecast	X	X	•	O	•	O	•	O	O
Hydraulic: Pipeline	X	X	X	X	X	X	X	X	X
Mechanical: Sidecast	X	X	•	O	•	O	•	O	O
Mechanical: Barge	X	X	X	X	X	X	X	X	X
Placement									
Land or In–Harbor Disposal with Bulkheading:	X	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)**
– Open Ocean Disposal at High Energy, Sandy Sites	X	•	O	•	O	•	O	•	O
– Open Ocean Disposal at Low Energy, Silty Sites	•	X	(b)	•	(b)	(b)	(b)	(b)	(b)
– Unconfined In–Harbor	X	•	O	•	O	•	O	•	O
– Beach Replenishment	X	•	O	•	O	•	O	•	O
Other Conditions									
Timing and Placement to Avoid Fisheries Impacts (Spawning and Running Periods and Areas)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)

LEGEND: X = Normally approvable.
• = Not normally approvable.
(a) = Normally approvable but control of effluent will be required.
(b) = Approvable only after bioassay, performed in accordance with established EPA procedures, indicates no significant biological impact. A statistically comparable project which has successfully passed the bioassay test may be substituted. If a significant biological impact is found, this material is unsuitable for open water disposal.
(c) = Required in all cases.

---

* Table III from 314 CMR 9.03.

** Preferred option.

One placement option is open ocean disposal at low energy, silty sites. This is approvable only after bioassay, performed in accordance with established EPA procedures, indicates no significant biological impact. If a significant biological impact is found, this material is unsuitable for open water disposal. Pursuing this option for these Category Three, Type C sediments is questionable and depends greatly on the disposal site itself. For this reason, other alternatives were explored.

A review of other approvable placement options for this type of dredge material reveals that the preferred method of disposal is land or in-harbor disposal with bulkheading. The dredge material, in this case, could be used as fill for the bulkhead area that has deteriorated. The regulations indicate that this option is approvable but that control of effluent will be required.

5.1.4 Benthic Analysis of Fill Area

Introduction

The aquatic ecosystem of Boston Inner Harbor (origin at the Castle Island/ Governor's Island line to the confluence of the Mystic and Chelsea Rivers) has been subjected to physical and chemical stress from the surrounding urban environment. Aquatic life has been especially affected by combined sewer overflows and the accumulation of chemical wastes.

Benthic organisms are good indicators of environmental conditions in a body of water over time. The benthic communities in the project area and environs have been affected by a variety of pollution sources, particularly from the Mystic and Chelsea Rivers and local sewage discharge. Previous use of Pier 5 and the Boston Marine Works Pier No. 1 has somewhat modified the sediment composition (e.g., coal, tar, solder fragments) and, subsequently, the benthic biota in the project area. In addition, a major process influencing the community structure and sediment geochemistry of Boston Harbor's sediments may be the result of bed pelletization by polychaetes of the genus Capitella that produce long-lived fecal pellets which are characteristic of some sediments in the Boston Inner Harbor (Gallagher, 1988).

Sediments of the Boston Inner Harbor have previously been described as being highly organic, black and oily with a benthic community of pollution tolerant organisms. These benthic communities were composed mainly of opportunistic deposit feeders such as certain polychaetes and amphipods (Runas and Resi, 1968; Stewart, 1968; MES, 1977a, 1977b; NER, 1980; EG&G, 1984). Results of the June, 1988 benthic sampling are in good agreement with sampling results of earlier studies in the Boston Harbor area.

Taxonomic Composition and Dominant Organisms

The raw data generated and references utilized in this study are included in Appendix F. Table 5.1–4 lists the type, number, and density of organisms present in the samples. The intertidal and subtidal areas in the project site vicinity are not known habitat for any threatened or endangered species (DOI, 1986; NHP, 1988). Of the total organisms collected (1,577 individuals) at the 17 stations, 57% were polychaetes, 29% were oligochaetes, 12% were arthropods, and 2% were molluscs. The most common organisms, occuring in 14 of the 17 samples, were polychaetes of the family Capitellidae. Capitella spp. is the designation used for the Capitella capitata sibling species complex. These organisms are known to be tolerant of physical and chemical stresses characteristic of an urban harbor such as the Boston Inner Harbor. These organisms have a life history that includes short generation times and a high reproduction rate. This type of life history allows the proliferation of these organisms on a cyclic basis (Grassle and Grassle, 1974).

Sampling stations No. 1 – No. 4, located in the projected shoreline area (see Figure 5.1–1) had higher densities and a greater diversity of organisms than the other thirteen stations (see Table 5.1–1). Sediment at Station No. 1 consisted of black mud with a hydrogen sulfide odor, containing substantial pieces of debris including wood fragments, solder pieces, tar chunks, coal and metal bits, and leaves. The density of organisms was 5,875 specimens/m^2 with a taxonomic composition of 70% polychaetes, 27% oligochaetes, and 3% molluscs. Station No. 2 had sediment that was mainly coarse shell debris with tar chunks, leaf and wood fragments, coal bits, and barnacle fragments. The density of organisms was 8,100 specimens/m^2 with a taxonomic composition of 58% oligochaeta and 42% polychaeta. Station No. 3 had sandy sediments with small stones and mats of polychate and/or amphipod tubes. This station had the highest density of organisms with 10,850 specimens/m^2. The taxonomic composition was 47% polychaetes, 45% arthropods (28% crustaceans and 17% insect larvae), 5% oligochaeta, and 3% molluscs. Station No. 4 had coarse sandy sediments with shell debris and tar and coal fragments. The density of organisms was 8,675 specimens/m^2 with a taxonomic composition of 53% oligochaetes, 45% polychaetes, 1% molluscs, and 1% others (crustaceans and tunicates).

Stations No. 5 – No. 17 had densities ranging from 0 – 1,250 specimens/m^2. Taxonomic groups present included mainly polychaetes, Capitella spp., with a few oligochaetes and molluscs. All stations No. 5 – No. 17, with the exception of station No. 10, had mud sediments with a hydrogen sulfide odor and, for most, an oily sheen on the sediment surface. Station No. 10 had clay sediment with no benthic invertebrates present.

TABLE 5.1-4

TAXONOMIC COMPOSITION AND DENSITY OF BENTHIC ORGANISMS AT THE SAMPLING STATIONS

Sample No.	Type of Specimen	No. of Specimens	Total # of Specimens in Sample	No. of Specimen/m^2	Total No. of Specimens in Sample/m^2
1	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	64		1,600	
	Class Polycaheta				
	Capitella spp.	131		3,275	
	Capitellidae	28		700	
	Eteone longa	1		25	
	Polydora sp.	5		125	
	Phylum Mollusca				
	Class Bivalvia				
	Modiolus sp. juv.	5		125	
	Mya arenaria juv.	1	235	25	5,875
2	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	187		4,675	
	Class Polycaheta				
	Capitella spp.	83		2,075	
	Capitellidae	16		400	
	Harmathoe imbricata	2		50	
	Nereis arenaceodonta	8		200	
	Polydora sp.	24		600	
	Spionidae	3		75	
	Phylum Mollusca				
	Class Bivalvia				
	Mya arenaria juv.	1	324	25	8,100
3	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	22		550	
	Class Polychaeta				
	Capitella spp.	19		475	
	Capitellidae	4		100	
	Fabricia sabella	41		1,025	
	Polydora sp.	142		3,550	

– Continued –

TABLE 5.1-4 (Continued)

Sample No.	Type of Specimen	No. of Specimens	Total # of Specimens in Sample	No. of Specimen/m^2	Total No. of Specimens in Sample/m^2
3 (Cont)	Phylum Mollusca				
	Class Bivalvia				
	Modiolus sp. juv.	10		250	
	Mya arenaria juv.	3		75	
	Phylum Arthropoda				
	Class Crustacea				
	Corophium sp.	120		3,000	
	Class Insecta				
	Insect Larvae	73	434	1,825	10,850
4	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	185		4,625	
	Class Polychaeta				
	Capitella spp.	34		850	
	Capitellidae	112		2,800	
	Harmathoe imbricata	3		75	
	Polydora sp.	4		100	
	Spionidae	2		50	
	Phylum Mollusca				
	Class Bivalvia				
	Modiolus sp. juv.	3		75	
	Mya arenaria juv.	2		50	
	Phylum Arthropoda				
	Class Crustacea				
	Microdeutopus sp.	1		25	
	Phylum Chordata				
	Class Ascidiacea				
	Sessile Tunicate	1	347	25	8,675
5	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	4		100	
	Class Polychaeta				
	Capitella spp.	7	11	175	275

– Continued –

TABLE 5.1-4 (Continued)

Sample No.	Type of Specimen	No. of Specimens	Total # of Specimens in Sample	No. of Specimen/m^2	Total No. of Specimens in Sample/m^2
6	Phylum Annelida				
	Class Oligochaeta				
	Oligochaeta	1	1	25	25
7	Phylum Annelida				
	Class Polychaeta				
	Capitella spp.	3		75	
	Phylum Mollusca				
	Class Bivalvia				
	Modiolus sp. juv.	1	4	25	100
8	Phylum Annelida				
	Class Polychaeta				
	Polychaete fragments	0	0	0	0
9	Phylum Annelida				
	Class Polychaeta				
	Capitella spp.	33	33	825	825
10	None 0	0	0	0	0
11	Phylum Annelida				
	Class Polychaeta				
	Capitella spp.	20	20	500	500
12	Phylum Annelida				
	Class Polychaeta				
	Capitella spp.	21	21	525	525

– Continued –

TABLE 5.1-4 (Continued)

Sample No.	Type of Specimen	No. of Specimens	Total # of Specimens in Sample	No. of Specimen/m^2	Total No. of Specimens in Sample/m^2
13	Phylum Annelida Class Polychaeta *Capitella* spp.	50	50	1,250	1,250
14	Phylum Annelida Class Polychaeta *Capitella* spp.	1	1	25	25
15	Phylum Annelida Class Polychaeta *Capitella* spp.	47	47	1,175	1,175
16	Phylum Annelida Class Polychaeta *Capitella* spp.	14	14	350	350
17	Phylum Annelida Class Polychaeta *Capitella* spp.	35	35	875	875

Discussion

The objective of this study was to characterize benthic organisms that would be impacted by dredging and filling associated with shoreline improvements in the project area. Benthic organisms identified from samples taken in the project site vicinity were found to be typical of the polychaete dominated fauna known to occur in an urban environment such as Boston Inner Harbor. No rare or endangered species were found.

Higher densities of benthic organisms ($5{,}875/m^2$ – $10{,}850/m^2$) were found at stations No. 1 – No. 4. The higher densities and greater diversity of organisms occurring at these stations are probably related to the type of sediment at the stations. The sediments at stations No. 1 – No. 4 were coarser than those at stations No. 5 – No. 17. The level of pollution in sediments is highly correlated with the amount of silt/clay (fine particulate matter) since chemicals adsorb to fine particulate matter. Sediments with fine particulate matter also have minimal interstitial space which does not allow for good water flushing. Coarser sediments, such as those at stations No. 1 – No. 4, usually have a lower organic content since larger interstitial spaces allow better water flushing. Thus, the large interstitial spaces do not promote accumulation of pollutants (Gray, 1974; Michael, 1988). Stations No. 5 – No. 17 had the finer mud or clay sediments and, in some cases, were observed to have a hydrogen sulphide odor and a surficial oily sheen. Densities in these sediments were much lower than those in stations No. 1 – No. 4, and the diversity of organisms was low.

The majority of specimens examined from stations No. 3 and No. 4 appeared to be primarily juveniles. Since sampling was conducted only once, during the late spring/early summer season, it is not known if the high densities observed in June will continue for the remainder of the seasons. Juveniles occurring in the June samples may not survive to be adults due to the pollutant loads (Michael et al., 1975). Recent studies in the Boston Harbor with seasonal sampling (COE, 1987) have indicated that high densities of the genus *Capitella* may be found in summer samples but not in late fall samples. This is due to high suspended organic loads in Boston Harbor that will cause an oxygen depletion in the water column as the harbor warms and stratifies in late summer. This oxygen depletion in concert with other environmental stresses is detrimental to the benthic fauna. Winter mixing and cooling allows benthic organisms to re-establish themselves (COE, 1987). Sampling stations that are azoic during different seasons may have additional stress of sulphide and petroleum pollution that is not tolerated even by opportunistic species (James and Gibson, 1980).

The impact of dredging on either side of the proposed Pier 5 will result in some loss of benthic organisms. Dredging impacts are, however, expected to be temporary and localized, with subsequent re-establishment of benthic habitat and community populations following dredging. Dredging will not be performed during the winter flounder season; this will additionally minimize the effect of this work.

The impact of placing the fill behind the new retaining wall to make a straight shoreline edge will result in the loss of the benthic populations located in that small area. Presence of the new retaining wall surface, however, will allow for potential settlement of sessile, attached marine growth such as barnacles, tunicates, hydroids, algae, and the associated organisms that occur with such a community.

5.2 Deep Berthing/Navigation

While the piers included in the proposed Lobster Terminal and Waterfront Park site (East Boston Piers 4 and 5) are classified as "deep water piers", the site is considered inappropriate for commercial industrial maritime uses. Although water depths exceed 20 feet, the site has inadequate backlands and incomplete rail access. Potential traffic and land use conflicts with the adjoining East Boston residential neighborhood also argue against a deep berthing commercial shipping use.

5.2.1 Trends in Deep Berthing

The commercial shipping industry and associated deep berthing processes are in the midst of a great technological change. Commercial ships are becoming larger with operating depths exceeding 35 feet. Another trend in commercial shipping is the use of barges to transport general cargo containers. Large cargo ships unload at a "load center" (New York and Baltimore) and send the cargo to "feeder" ports (Boston) via barges or smaller vessels. However, since barges and smaller cargo carriers draft between 15-38 feet, deep water berthing areas are still needed. Many commercial maritime facilities also require several acres of backland for a storage area.

There are numerous factors controlling the location of a commercial maritime facility. To adequately service commercial shipping trends and deep berthing, a commercial maritime facility must meet all of the following requirements:

- Water Depth - Deep berthing requires a minimum mean low water depth of 35 feet, although many ships can utilize water depth of 30-35 feet; large ships (e.g., bulk carriers) require a minimum of 35 feet. Since the commercial shipping trend is towards larger ships with a deeper draft requirement, a commercial maritime facility should not be located in an area with a depth shallower than 35 feet. A deep berth facility must also have direct access to the shipping channel. The East Boston Piers have operating depths exceeding 35 feet. Table 5.2-1 inventories deep water berthing areas within Boston Harbor, as identified by the U.S. Army Corps of Engineers.

- Storage Area - Deep berthing facilities tend to be utilized by large cargo and bulk carrier ships. Therefore, large, secure backland areas are needed to accommodate cargo and bulk storage. This portion of the East Boston site contains only a small backland area, not large enough to accommodate the needs of a commercial maritime use.

- Pier, Wharf and Dock - The actual physical structure of a pier, wharf or dock must be capable of supporting berthing equipment, minimum storage, and loading/unloading vehicles. Since the trend is towards larger cargo carriers, the piers, wharfs and docks must also be relatively large and capable of supporting the associated large amounts of cargo to be loaded/unloaded. The East Boston site is dilapidated and requires significant investment to support berthing and other loading/unloading equipment.

- Transportation Network Access - Access to major highways and railroads is essential for transporting cargo from commercial ships. Since the trend in commercial shipping is towards container carrier barges, highway and railway access will become increasingly important for heavy trucks or rail cargo lines. The East Boston site has constrained highway access. The rail tracks are in disrepair, requiring substantial large capital investment to make them usable.

TABLE 5.2-1

INVENTORY OF DEEP BERTHING AREAS IN BOSTON*

Location	Linear Depth Feet	Existing Use	Owner
Chelsea			
3 Broadway Street	695	Marine Industrial	Ultamar Petroleum
Charlestown			
Constitution Road (3 parcels)		Commercial, Office, Retail	Massport
105 Constitution Rd.		Parking	Massport
105 Water Street		Commercial, Office, Retail, Parking	O'Connell Development, Inc.
115 Water Street			Karning Dinijian Trust
125 Water Street		Marine Recreational, Public Health	U.S. of America
S.W.S. Eighth Street		Under Construction	BRA
212-215 Terminal St. 180 Terminal St., 60 Terminal St.	3,837	Marine Industrial, Vacant	Massport
Downtown Boston			
466 Hanover Street	80	Maritime Public Safety and Health	U.S.A. Coast Guard
East Boston			
460, 570 Chelsea St.	1,177	Marine Industrial	Mobile Corporation
229 Marginal Street (Piers 1-5)**	3,242	Marine Industrial, Vacant	Massport
172, 146, 142 Condor St.	44	Marine Industrial	State Fuel Company, Inc.
Everett			
Broadway Street	80	Vacant	Realty Income Trust
Broadway Street	320	Marine Industrial	Hugo New Steel and Porolerized T.S.
Broadway Street (3 parcels)	476	Marine Industrial	Exxon Company, U.S.A.
South Boston			
162 Northern Avenue (2 parcels)	5,500	Maritime Transport.	Massport
Conley Terminal, Castle Island	4,210	Maritime Industrial	Massport
500 East First St.	84	Marine Industrial	Texaco Inc. Development Co.
666R Summer Street	5,021	Marine Industrial	U.S. Government
666 Summer Street	900	Marine Industrial	EDIC
660 Summer Street	350	Marine Industrial	EDIC
310 Northern Avenue	2,160	Marine Industrial	EDIC

---

* U.S. Army Corps of Engineers, The Port of Boston, Massachusetts - Port Siren No. 3, 1983.

**Includes the Lobster Terminal and Park site.

Potential new commercial maritime deep berth parcels located in Boston Harbor were evaluated in a 1986 Boston Harbor Associates study.* The study created a detailed Boston inner harbor database which inventoried ownership, water frontage, backland area, water depth, pier conditions, road access, channel access, current use, wave exposure, and compatibility with other landside users. The detailed database was organized to be used in a variety of ways to evaluate and assess both land and waterside uses of the Boston inner harbor. The study concluded that there is not a new site in Boston Harbor that satisfies all of the deep berthing requirements.

5.2.2 Evaluation of Deep Berthing Potential on the East Boston Piers

The waterside access to the East Boston Piers is constrained for commercial or industrial maritime utilization. Street access via Marginal Road presents conflict for the amount of truck traffic anticipated by such a major commercial use and rail access would have to be significantly upgraded to be even remotely feasible. The railway access has been unused and abandoned for years. Although the right-of-way rail easement exists, the tracks are in disrepair and would need a substantially large capital investment to make them usable.

A commercial industrial marine use of Piers 4 and 5 is not appropriate in combination with the surrounding high density residential neighborhood. In fact, incompatibility with surrounding land uses was the primary reason the Massachusetts Water Resources Authority (MWRA)* eliminated this site for the transport of construction materials and operation supplies for the Deer Island wastewater treatment plant construction. The MWRA concluded that the amount of vehicular traffic and associated roll-on/roll-off facility would not be appropriate for the neighborhood. Other uses explored include use of the site for a coal port or a container terminal. However, use of the site for these types of commercial industrial maritime use would have an even greater impact upon the neighborhood (especially if rail transport were to be implemented) than the proposed MWRA short-term facility. Finally, additional significant investment is required to replace the dilapidated piers on the site.

---

* The Boston Harbor Associates, Boston Inner Harbor Water-Dependent Use, October 1986.

5.2.3 Flexibility of Proposed Alterations

The location of the Lobster Terminal and Waterfront Park at the East Boston Piers 4 and 5 is an appropriate use of the site. Although the proposed lobster terminal does not utilize the deep water of the site, it is in accord with surrounding land uses and neighborhood perceptions, and benefits the marine-related lobster industry in Boston Harbor. The Lobster Terminal and Waterfront Park project provides a good balance of an important maritime use and neighborhood constraints.

In addition, the proposed lobster terminal facility and waterfront park will not hinder future uses on adjacent parcels. Flexibility theoretically exists for converting the lobster facility and waterfront park to other uses due to the absence of large physical structures. However, once in use, the waterfront park will be under the jurisdiction of MGL Chapter 92 since it will be developed with State Commonwealth funds.** This State law requires a two-thirds majority vote from both branches of the State Legislature to convert a park to any other land use.

5.2.4 Navigation

Commercial maritime navigational constraints in Boston Harbor include physical obstacles (shoals, islands, reefs) and physical constraints (e.g., the number of boats in the channel). The proposed lobster terminal at the East Boston Piers 4 and 5 is not restricted by navigational constraints and will not cause a navigational hazard.

The proposed lobster terminal will provide for approximately 44 boats during the April-December season. The boats normally depart between 5:00 - 6:00 AM and return between 2:00 - 5:00 PM. According to the Boston Harbor Coast Guard Station and Boston Harbor Pilots, the comings and goings of the lobster boats will not affect navigation in the East Boston area or the passing channel. It is also predicted that the Boston Marine Works waterway traffic will not affect navigation of the lobster terminal or vice versa due to the differing hours of activity and the physical relationship. The Boston Coast Guard and Harbor Pilots also report that there are not any physical obstacles that would affect navigation in the East Boston Piers 4 and 5 area.

---

* MWRA "On-Shore Water Transportation Facilities", September 1986.

** EOEA: Division of Conservation Services; Wes Marshall phone conversation, May 27, 1988.

5.3 Traffic

The traffic analysis for this Draft EIR defines the expected project impacts resulting from additional vehicle trips generated by the Massport Lobster Terminal and Waterfront Park. The impacts associated with this project were included in the assessment of the adjacent Boston Marine Works project (EOEA No. 6407), since an ENF for the Lobster Terminal and Park had been filed prior to the submittal of the Boston Marine Works ENF. In order to assess the incremental impacts associated with the Lobster Terminal and Park, however, the Massport project impacts have been added to traffic associated with:

- Full development of the Clippership Wharf Project,
- Full development (Phases I and II) of the Boston Marine Works Project, and
- Future background growth accounting for expected local and regional growth.

For the purposes of this analysis, a build-out year of 1992 is assumed for full development of the Lobster Terminal and Waterfront Park project.

Traffic operations for existing conditions, and for a future (1992) No-Build Alternative (i.e., future condition without the proposed project) have been evaluated. In addition, operations for a 1992 condition with the project in operation is presented.

5.3.1 Existing Study Area Characteristics

The proposed Lobster Terminal and Waterfront Park project is located adjacent to the Jeffries Point residential neighborhood in East Boston. Access to the project site is provided along local streets. A primary concern of development in the East Boston Piers area is, therefore, the relationship of East Boston neighborhood access, circulation, and parking needs to the project's access demands.

Study Area Intersection Locations

The traffic analysis has focused on an evaluation of morning and evening peak hour traffic operations at ten key intersections within the study area. These locations are identified below and illustrated in Figure 5.3-1.

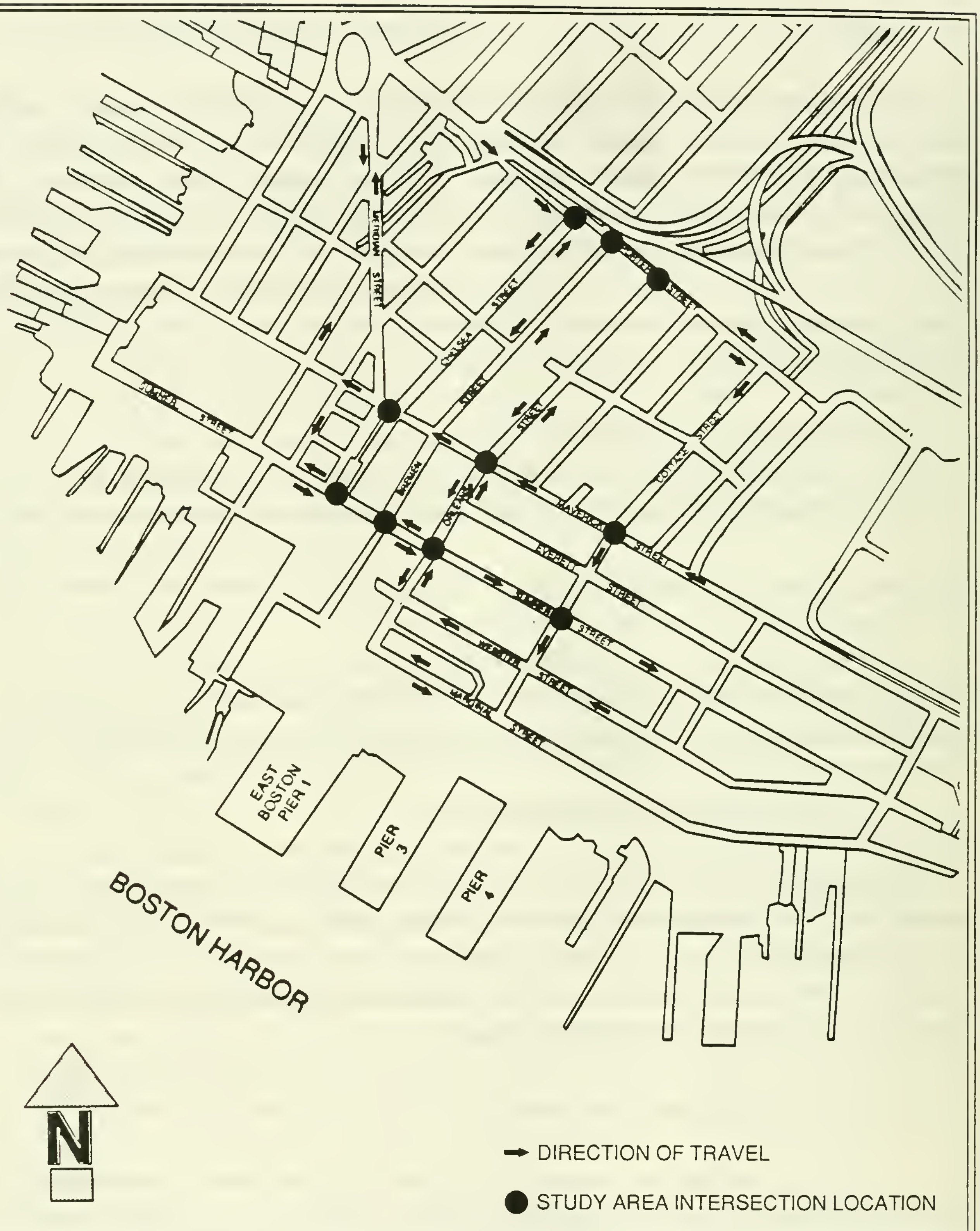


FIGURE 5.3–1
STUDY AREA INTERSECTION LOCATIONS

- Chelsea Street @ Porter Street;
- Porter Street @ Orleans Street;
- Sumner Street @ Maverick Square;
- Bremen Street @ Porter Street;
- Maverick Street @ Maverick Square;
- Maverick Street @ Orleans Street;
- Maverick Street @ Cottage Street;
- Sumner Street @ Bremen Street;
- Sumner Street @ Orleans Street; and
- Sumner Street @ Cottage Street.

The physical and operational characteristics of these key intersection locations are outlined in Appendix G.

5.3.2 Existing Conditions Transportation Analysis

Existing (1988) traffic volume levels were developed based upon a recent Draft EIR submitted for the Clippership Wharf Project.* That Draft EIR included a comprehensive traffic count program conducted during 1986. The 1986 data were increased by 2% per year** to 1988. This 2% per year factor was applied to account for local and regional growth in the area and is based upon a review of relevant historic traffic count data.

The resultant 1988 AM and PM peak hour turning movement counts for study area intersection locations are presented in Figures 5.3-2 and 5.3-3, respectively.

Traffic Operations

Traffic operations were analyzed according to standard procedures and practices outlined in the "Highway Capacity Manual".*** Traffic signal cycle lengths were obtained from signal permits, and verified manually in the field during peak hour periods.

---

* Clippership Wharf DEIR, Skidmore, Owings & Merrill, et al., September 1986.

** Based on review of historic data from Massachusetts DPW traffic count stations.

*** "Highway Capacity Manual," Transportation Research Board Special Report 209, 1985.

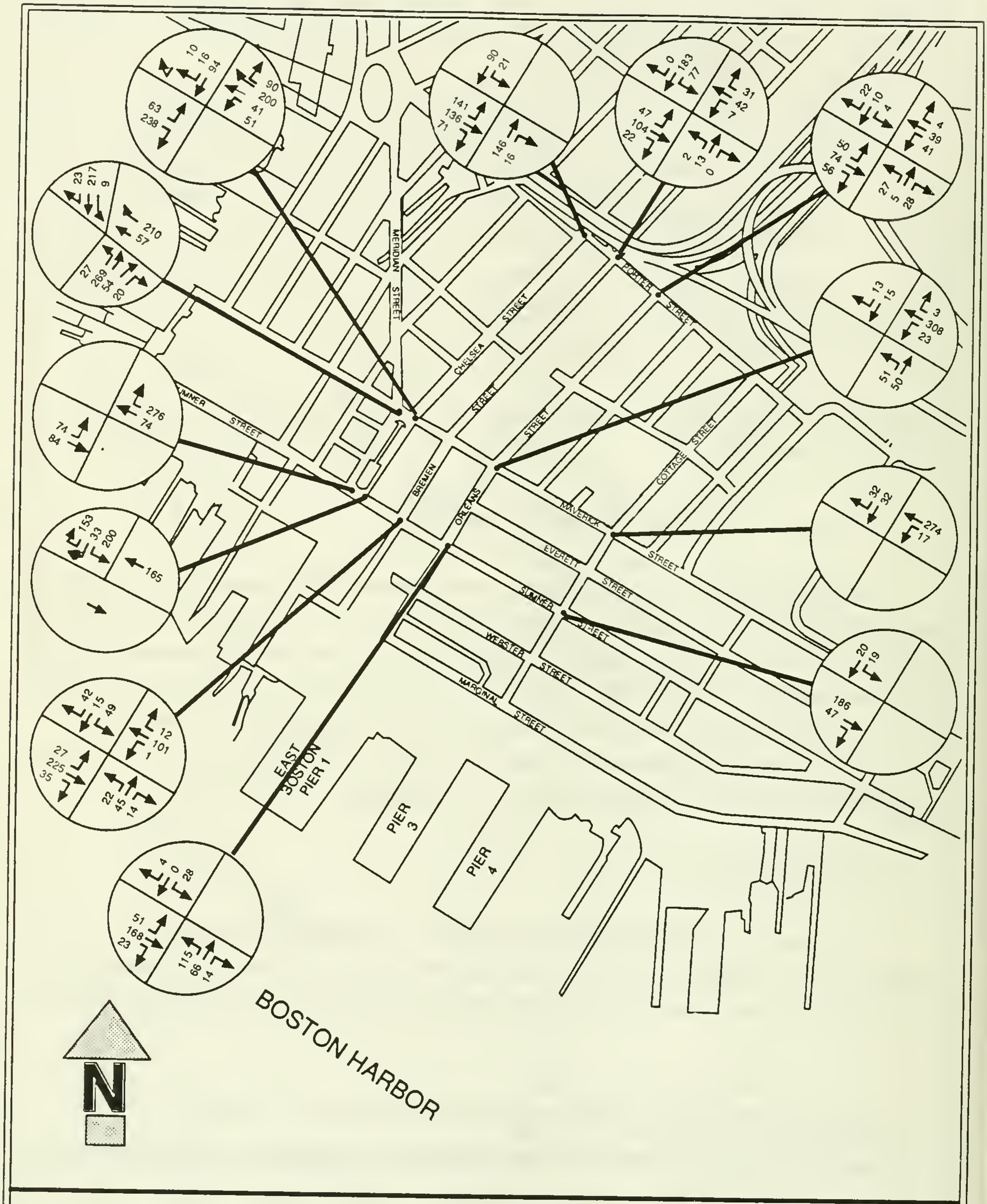


FIGURE 5.3-2
EXISTING (1988) AM PEAK HOUR VOLUMES

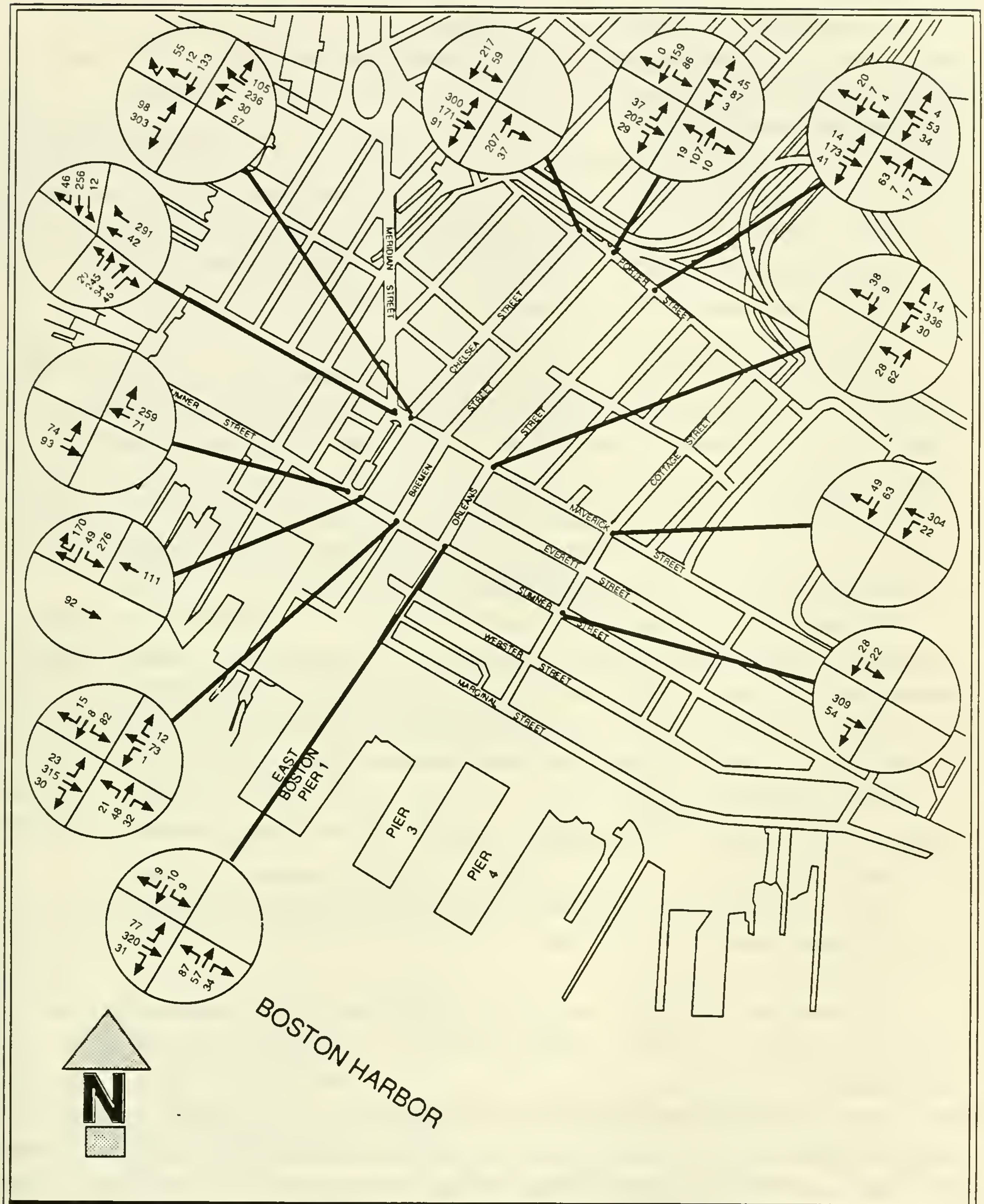


FIGURE 5.3–3

EXISTING (1988) PM PEAK HOUR VOLUMES

In assessing both existing and estimated future traffic conditions from the perspective of vehicular operations, traffic capacity/Levels of Service ("LOS") analyses have been conducted at the key intersections in the study area, in accordance with the Transportation Research Board's 1985 Highway Capacity Manual (Special Report 209). These analyses are devised to indicate how many vehicles per hour can pass a point on a roadway or travel through an intersection given the physical layout and controls, and at what LOS. On urban streets, critical points most often occur at intersections with traffic flow constrained by signals or under "stop" or "yield" control. Consequently, capacity/LOS assessments are performed almost exclusively at intersections.

Levels of Service are in the range of A to F, from best to worst and, for signalized intersections, represent degrees of delay. LOS "A" indicates little or no delay, with practically all traffic clearing a signal on the same cycle (green-red-green sequence) on which it arrives. At lower LOS, delays increase, with more traffic having to wait for the next or subsequent cycles. With increased saturation, volumes increase up to a maximum, at LOS "E"; beyond LOS "E" flow breaks down for a variety of reasons, such that volumes may drop and congestion still increase. This condition yields LOS "F", characterized by average stopped delay per vehicle exceeding one minute.

For non-signalized intersections, the factor of delay is also implied, but for analysis purposes, a measure called Reserve Capacity is used to indicate LOS. Reserve capacity represents the number of traffic gaps per hour in main stream traffic which are not used by a sidestreet traffic demand. These available gaps (of acceptable length) would occur at times when no sidestreet vehicle is present to utilize them. At zero Reserve Capacity, all available, acceptable gaps are taken. For minus Reserve Capacity, sidestreet demand exceeds available gaps. The relationship of LOS criteria with delay and reserve capacity is presented in Table 5.3-1.

LOS "C" (sometimes "D") or better is considered acceptable for urban conditions. The "V/C ratio", when noted, expresses the ratio of the demand volume to the maximum capacity.

The previously presented 1988 AM and PM peak hour volumes were used to calculate existing operational levels of service. Table 5.3-2 presents these LOS determinations for the study area intersections. At the present time, AM and PM peak hour traffic operations are generally at acceptable levels at all locations analyzed. All locations except Maverick Street @ Maverick Square are at LOS "C", or better, during both AM and PM peak hour periods. During the PM peak hour, operations at the unsignalized intersection of Maverick Street at Maverick Square are at LOS "D".

TABLE 5.3-1

LEVEL OF SERVICE (LOS) DESIGNATIONS*

Category	Description	Delay Range (Seconds Per Vehicle)**	Reserve Capacity (Passenger Cars Per Hour)***
LOS A:	Describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds. Little or no delays result for side-street motorists.	0.00-0.50	400
LOS B:	Describes a condition of stable flow, with desired operating speeds relatively unaffected, but with a slight deterioration of maneuverability within the traffic stream. Side street motorists experience short delays.	5.1-15.0	300-399
LOS C:	Describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted. The general level of comfort begins to deteriorate noticeably at this level. Motorists entering from side streets experience average delays.	15.1-25.0	200-299
LOS D:	Describes a high-density traffic condition approaching unstable flow. Speeds and maneuverability become more seriously restricted, and the driver experiences a poor level of comfort. Side-street motorists may experience long delays.	25.1-40.0	100-199
LOS E:	Represents conditions at or near the capacity of the facility. Flow is usually unstable, and freedom to maneuver within the traffic stream becomes extremely difficult. Very long delays may result for side street motorists.	40.1-60.0	0-99
LOS F:	Describes forced flow or breakdown conditions with queuing along critical approaches. Operating conditions are highly unstable as characterized by erratic vehicle movements along each approach.	60.1 or greater	N/A

---

* Source: "Highway Capacity Manual", Transportation Research Board Special Report 209; National Research Council, 1985.

** Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. This criteria is intended for use in the evaluation of signalized intersections.

*** Reserve capacity refers to the unused capacity of the minor approach, on a per lane basis. This criteria is limited to use in the evaluation of unsignalized intersections.

TABLE 5.3-2
1988 EXISTING PEAK HOUR
INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

	Intersection	Peak Hour	LOS	Average Delay (Sec/Veh)
1)	Chelsea Street	AM	B	11.9
	@ Porter Street	PM	C	17.9
2)	Porter Street	AM	B	6.6
	@ Orleans Street	PM	B	7.0
3A)	Sumner Street @ Maverick Square	AM	C	16.4
	(Meridian Street)	PM	C	15.5
3B)	Sumner Street @ Maverick Square	AM	B	11.4
	(Chelsea Street)	PM	B	11.9

UNSIGNALIZED INTERSECTIONS
(Most Constrained Traffic Movement)

	Intersection	Peak Hour	LOS	Reserve Capacity
4)	Bremen Street	AM	A	465
	@ Porter Street	PM	B	302
5A)	Maverick Street @ Maverick Square	AM	B	307
	(Meridian Street)	PM	C	225
5B)	Maverick Street @ Maverick Square	AM	B	354
	(Chelsea Street)	PM	D	168
6)	Maverick Street	AM	A	520
	@ Orleans Street	PM	A	502
7)	Maverick Street	AM	A	685
	@ Cottage Street	PM	A	599
8)	Sumner Street	AM	A	532
	@ Bremen Street	PM	B	381
9)	Sumner Street	AM	A	585
	@ Orleans Street	PM	A	456
10)	Sumner Street	AM	A	681
	@ Cottage Street	PM	A	562

Safety

Historic accident data for area-wide intersections were summarized in a recent (1986) Draft EIR*. These data indicated a relatively low accident rate at 26 intersection locations analyzed within the general area. This information is presented in Table 5.3-3, for the applicable study area intersections. A review of this table indicates the relatively low incidence of accidents at study area intersections.

5.3.3 1992 No-Build Conditions Transportation Analysis

No-Build Traffic Volume Levels

The No-Build alternative combines existing traffic volumes plus specific traffic associated with Clippership Wharf and Boston Marine Works. In addition, an increase in baseline traffic volumes of 2% per year, representing normal local and regional traffic growth, is included. The No-Build alternative is, therefore, an estimate of likely 1992 traffic volumes at surrounding neighborhood intersections if the Lobster Terminal and Park are not built.

Traffic associated with future development on the remaining East Boston Piers is not included in the No-Build Condition since the proposed development program is not yet known and has not initiated MEPA review. However, an overview of the potential impacts associated with that development has been outlined in Section 5.3.6.

The 1992 No-Build traffic levels were developed by:

o Increasing the existing (1988) traffic volumes by an annual rate of 2% per year to 1992, to account for normal local and regional background growth; and

---

* Clippership Wharf DEIR, Skidmore, Owings & Merrill, et al., September 1986.

TABLE 5.3-3

ACCIDENT HISTORY*

		Fatalities	Personal Injuries	Property Damage Only
1)	Chelsea Street @ Porter Street	0	3	0
2)	Porter Street @ Orleans Street	0	0	2
3)	Sumner Street @ Maverick Square	0	0	0
4)	Bremen Street @ Porter Street	0	0	0
5)	Maverick Street @ Maverick Square	0	1	1
6)	Maverick Street @ Orleans Street	0	1	2
7)	Maverick Street @ Cottage Street	0	2	1
8)	Sumner Street @ Bremen Street	0	0	1
9)	Sumner Street @ Orleans Street	0	0	1
10)	Sumner Street @ Cottage Street	0	0	1

---

* Source: Clippership Wharf DEIR, Skidmore, Owings & Merrill, et al., September 1986; data is for calendar year 1983 - the latest data available from the Registry of Motor Vehicles.

- Adding new traffic to the area associated with Clippership Wharf* and Boston Marine Works**, both previously filed with MEPA.

Vehicular traffic associated with these developments is estimated to be as follows:

	AM Peak Hour			PM Peak Hour			ADT		
	In	Out	Total	In	Out	Total	In	Out	Total
Clippership Wharf*	40	100	140	110	40	150	800	800	1,600
Boston Marine Works**	110	22	132	54	115	169	871	871	1,742
TOTAL	150	122	272	164	155	319	1,671	1,671	3,342

The resultant 1992 No-Build traffic volumes for AM and PM peak hour periods are presented in Figures 5.3-4 and 5.3-5, respectively.

No-Build Traffic Operations

Using the projected 1992 traffic volumes for the No-Build alternative, the study area intersections were again analyzed. Table 5.3-4 summarizes the results of this analysis, indicating the changes in reserve capacities at unsignalized intersections and in average delays at those that are signalized. Any accompanying changes in the LOS characterizing these intersections are also noted. The complete results of the analysis appear in Appendix G.

From Table 5.3-4 it is apparent that only minor changes in the operational effectiveness of the study area intersections are anticipated to occur by 1992. Two exceptions are the intersections of Maverick Street with Meridian and Chelsea Streets. By 1992, at both of these locations, declines in Levels of Service to a classification lower than "C" are expected to accompany growth not associated with the development of the Lobster Terminal and Park.

---

* As presented in "Clippership Wharf DEIR", EOEA No. 5866, Skidmore, Owings & Merrill, et al., September, 1986.

** As presented in "The Boston Marine Works FEIR", EOEA No. 6407, HMM Associates, Inc., January 30, 1988.

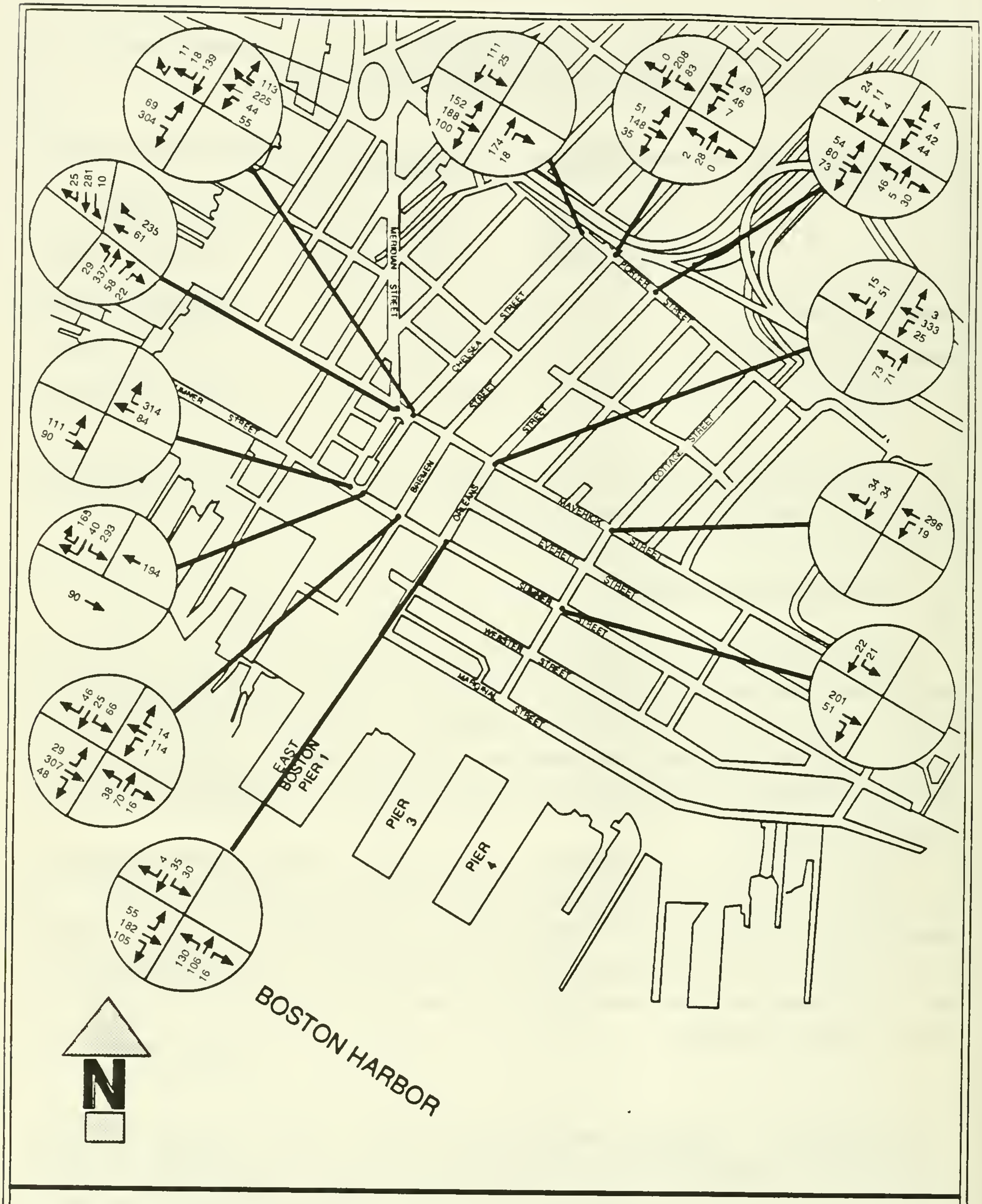


FIGURE 5.3–4

NO–BUILD (1992) AM PEAK HOUR VOLUMES

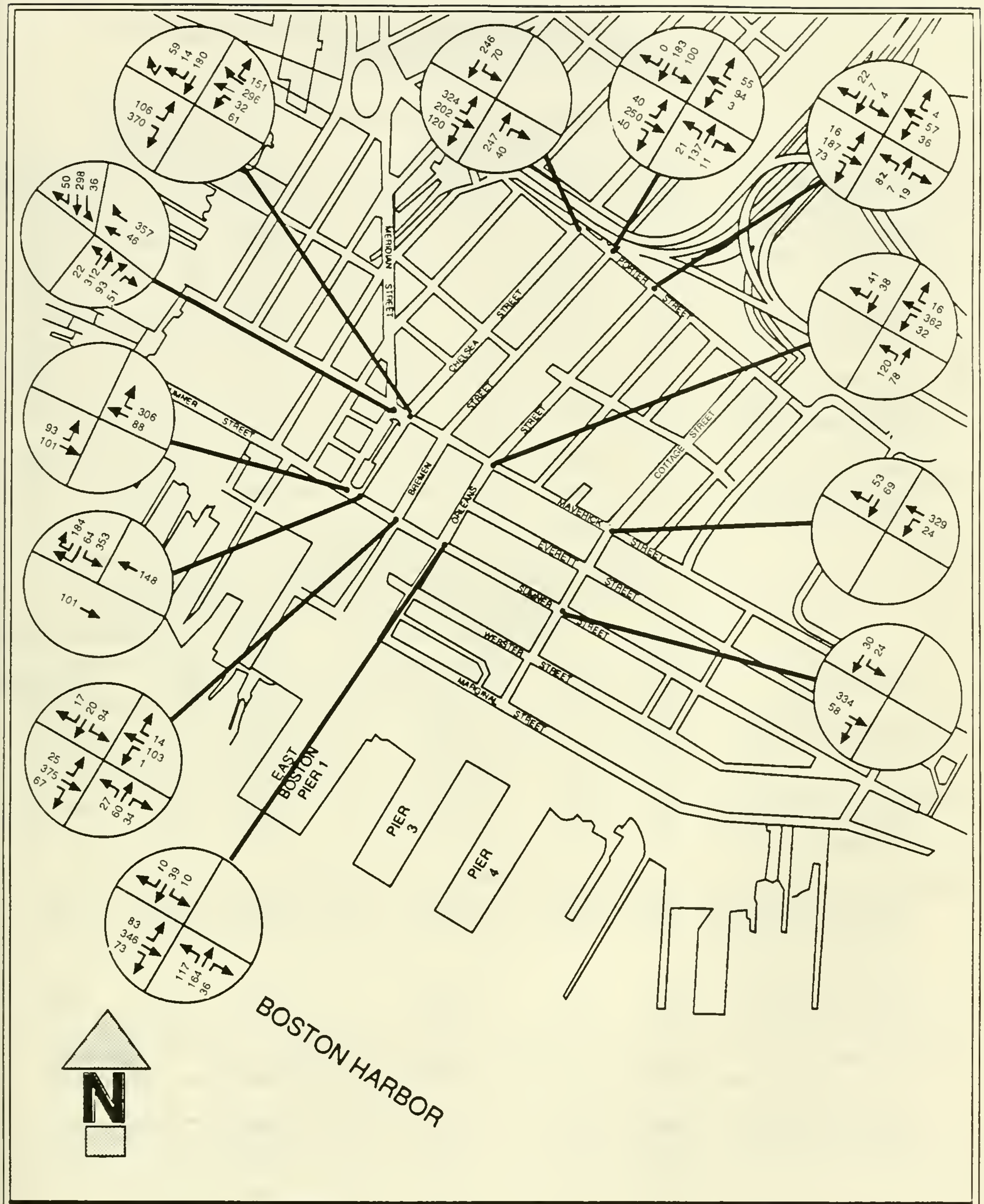


FIGURE 5.3–5

NO–BUILD (1992) PM PEAK HOUR VOLUMES

TABLE 5.3-4
1992 NO-BUILD PEAK HOUR INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

		1988 Existing			1992 No-Build		
	Intersection	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)
1)	Chelsea Street	AM	B	11.9	AM	B	13.3
	@ Porter Street	PM	C	17.9	PM	C	20.2
2)	Porter Street	AM	B	6.6	AM	B	7.0
	@ Orleans Street	PM	B	7.0	PM	B	7.2
3A)	Sumner Street	AM	C	16.4	AM	C	20.6
	@ Maverick Square	PM	C	15.5	PM	C	19.3
	(Meridian Street)						
3B)	Sumner Street	AM	B	11.4	AM	B	12.1
	@ Maverick Square	PM	B	11.9	PM	B	13.2
	(Chelsea Street)						

UNSIGNALIZED INTERSECTIONS
(Most Constrained Traffic Movement)

y

		1988 Existing			1992 No-Build		
	Intersection	Peak Hour	LOS	Reserve Capacity (Vehicles)	Peak Hour	LOS	Reserve Capacit (Vehicles)
4)	Bremen Street	AM	A	465	AM	B	362
	@ Porter Street	PM	B	302	PM	D	189
5A)	Maverick Street	AM	B	307	AM	E	55
	@ Maverick Square	PM	C	225	PM	F	-7
	(Meridian Street)						
5B)	Maverick Street	AM	B	354	AM	D	222
	@ Maverick Square	PM	D	168	M	E	62
	(Chelsea Street)						
6)	Maverick Street	AM	A	520	AM	A	423
	@ Orleans Street	PM	A	502	PM	B	313
7)	Maverick Street	AM	A	685	AM	A	660
	@ Cottage Street	PM	A	599	PM	A	565
8)	Sumner Street	AM	A	532	AM	B	381
	@ Bremen Street	PM	B	381	PM	C	261
9)	Sumner Street	AM	A	585	AM	A	451
	@ Orleans Street	PM	A	456	PM	C	255
10)	Sumner Street	AM	A	681	AM	A	660
	@ Cottage Street	PM	A	562	PM	A	535

5.3.4 1992 Build Conditions Transportation Analysis

Project Trip Generation

Typical lobstering industry data provided by Koppernaes Engineering Ltd., designers of lobstering facilities worldwide, and additional data gathered in a limited response from a questionnaire to Boston lobstermen, suggests that vehicle usage will likely be one per boat. Given the lack of other centralized lobstering facilities from which to draw inferences, a conservative estimate of vehicle trips to be generated was developed. Consequently, a figure of 2 vehicle round-trips per boat per day was employed in this study to cover all trips associated with the boatslip users. This assumption is conservative, since 2 parking spaces per slip are provided. With a maximum of 44 planned boat slips, this rate projects that 176 total daily trip ends (88 in, 88 out) may occur.

Conversation with Boston lobstermen indicates that their trips to the facility will occur from 5:00 AM to 6:00 AM, and 2:00 PM and 5:00 PM. With a choice, lobstermen will depart prior to the peak evening rush-hour. It is likely, therefore, that much of the traffic generated by the Lobster Terminal will precede the AM and PM peak hours of the adjacent street network. However, again, because of the scarcity of precedents, a conservative approach to the temporal assignment of traffic generated by the facility was adopted. Peak hour traffic generation for the lobster terminal was based upon data presented in the ITE Trip Generation Manual, Fourth Edition for Light Industrial uses.* The resultant peak hour trips are considered to be worst-case conditions, since vehicle arrivals and departures would predominantly be during off-peak periods as indicated above.

Anticipated trip generation for the waterfront park was developed using rates given in the ITE Trip Generation Manual** for City Parks (Land Use Code 411).

---

* Source: ITE Trip Generation Manual, 4th Edition, 1987. Land Use Code 110 (Light Industrial), assuming approximately 2 employees per boat slip.

** Trip Generation Manual, Institute of Transportation Engineers, Fourth Edition, 1987.

The resulting trip generation estimates for the two uses are summarized in the following table:

	AM Peak Hour			PM Peak Hour			Average Daily Traffic (ADT)		
	In	Out	Total	In	Out	Total	In	Out	Total
Waterfront Park	12	0	12	0	18	18	48	48	96
Lobster Terminal	33	7	40	7	32	39	88	88	176
TOTAL	45	7	52	7	50	57	136	136	271

Build Condition Trip Distribution and Traffic Assignment

Project generated traffic was mathematically distributed onto the local roadway network based on data provided in a 1984 Massport report* for similar land uses in the area. These figures represent the general distribution of trips. The following table shows this distribution by primary entry/exit corridor:

To/From	% of Total Trips
Sumner and Callahan Tunnels:	50%
Route 1A/Chelsea Street – Bremen Street to Points North:**	40%
Meridian Street and McArdle Bridge:	10%

Project trips were assigned to the local street network, using these origin-destinations, based upon minimum travel time routings. Figures 5.3-6 and 5.3-7 present the expected traffic assignments to and from the site.

---

* Traffic Analysis – East Boston Harborside Project, R. S. Niedowski, March 1984.

** Includes approximately 5% local East Boston trips.

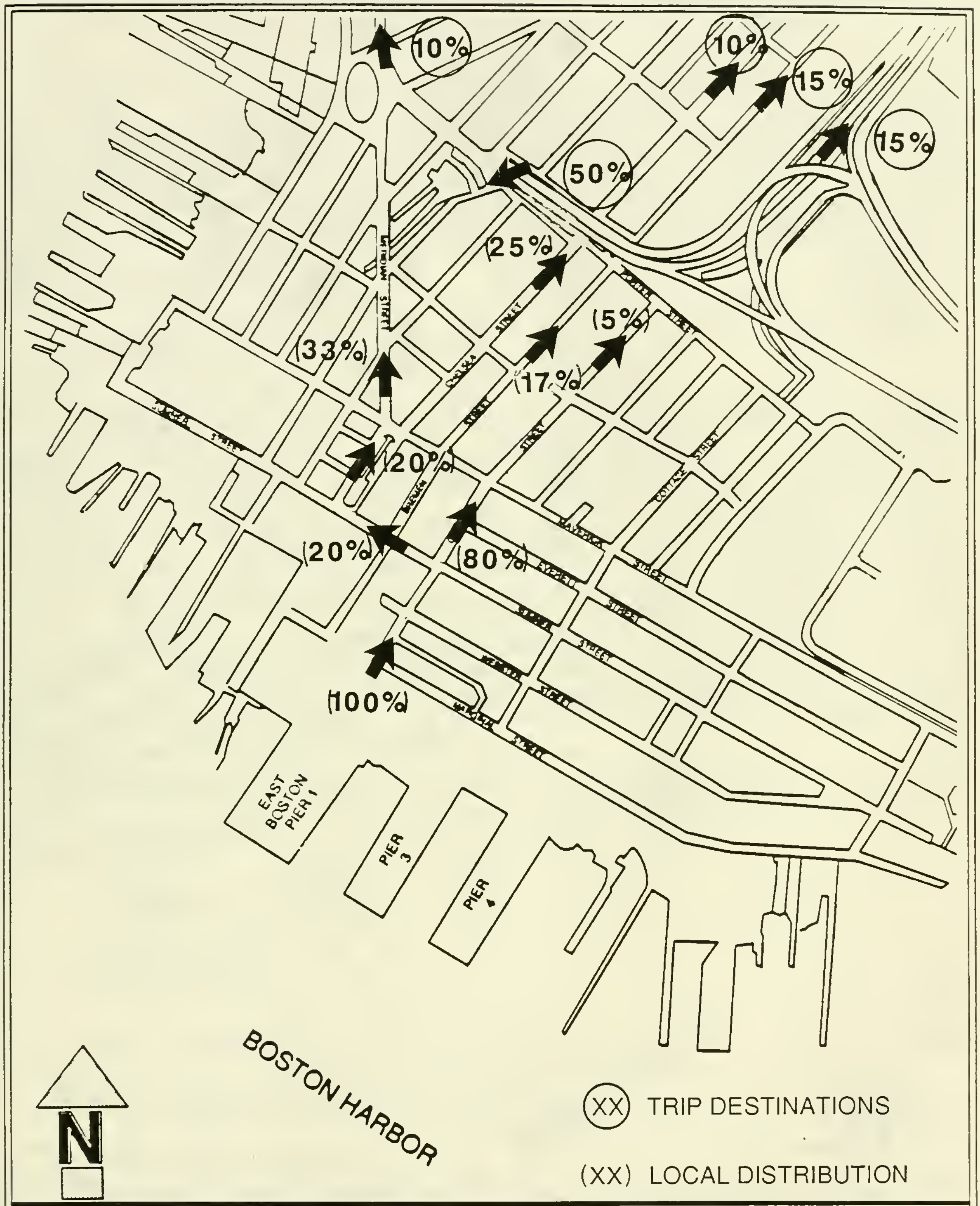


FIGURE 5.3-6
DISTRIBUTION OF PROJECT TRIPS FROM THE SITE

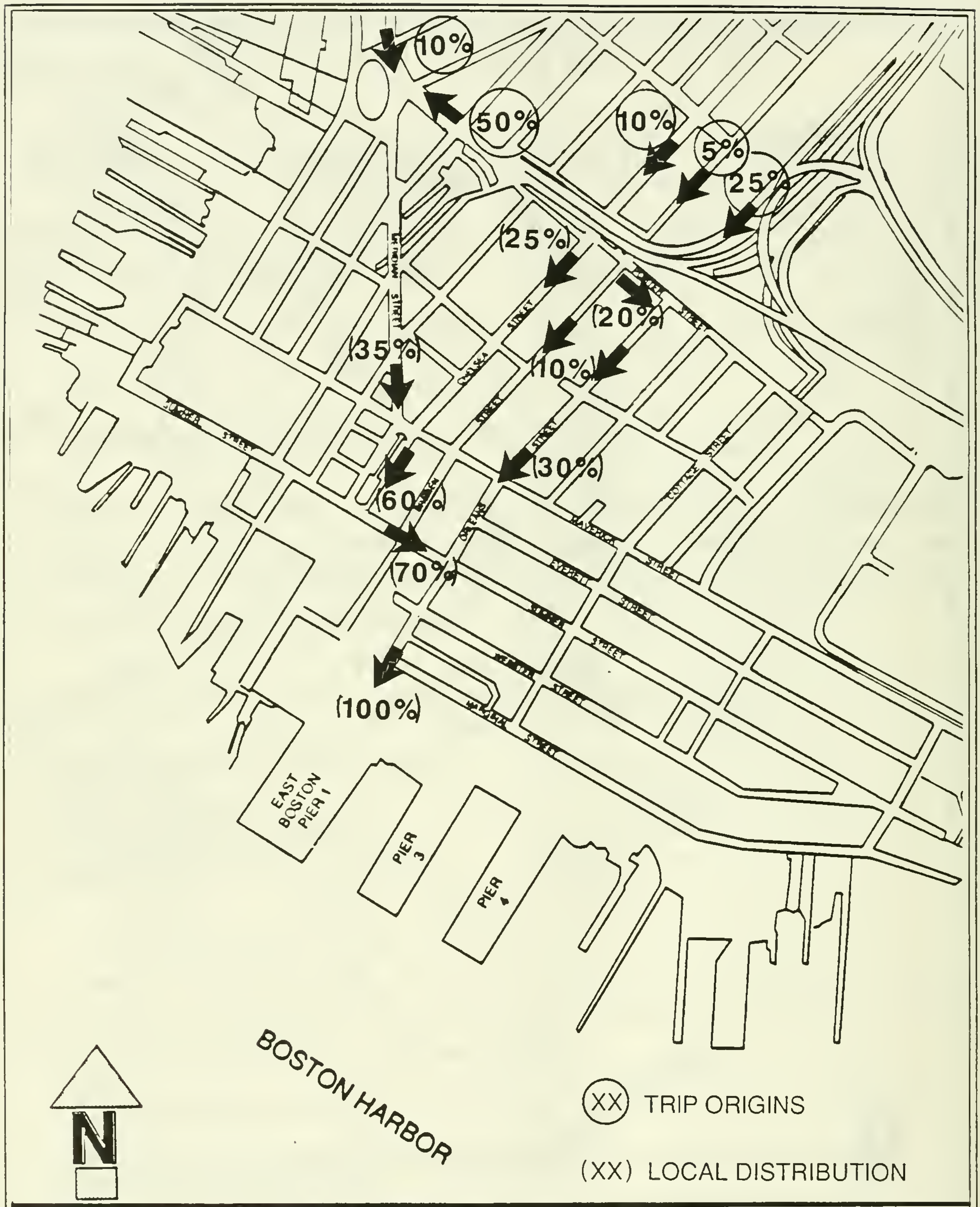


FIGURE 5.3–7

DISTRIBUTION OF PROJECT TRIPS TO THE SITE

Build Condition Traffic Volumes

Using the previously described trip distribution, the new trips generated by the project during the AM and PM peak hours were assigned to the roadway network and added to the No-Build traffic volumes. Figures 5.3-8 and 5.3-9 show the resultant traffic volumes for the AM and PM peak hours, respectively. Two intersections, Maverick Street at Cottage Street, and Sumner Street at Cottage Street were found not to be utilized by project-related traffic.

Build Condition Traffic Operations

The operation of the study area intersections was performed using the methodology previously described. Table 5.3-5 shows the results of this analysis, as well as the results obtained for Existing and No-Build conditions. As can be seen, only two intersections experience a decrease in level of service. The intersection of Maverick Street at Orleans Street drops from a LOS "B" to a "C" during the PM peak hour, while the intersection of Maverick Street at Maverick Square (Chelsea Street) drops from a LOS "E", under No-Build conditions, to LOS "F" during the PM peak hour. Since LOS "C" or better is considered acceptable, only the latter intersection can be expected to experience less than optimal operating conditions. This intersection, as part of the Clippership Wharf EIR process, has been recommended for signalization.

Overall, the traffic impacts associated with the proposed development appear to be minimal, with only one intersection being significantly impacted.

5.3.5 Parking and Circulation

Proposed Parking

Separate parking areas will be provided for each of the project elements. As shown in Figure 5.3-10, access to these parking areas will be from Marginal Street.

The Waterfront Park has been designed to provide a primarily passive recreational function and to serve the local community. It is expected that park users will arrive predominantly on foot. Parking spaces, however, will be provided for 25 cars to enable direct access by the elderly, families and others through vehicular means. This number, determined by reference to the Institute of Transportation Engineer's Parking Generation Manual rates for city parks, will be sufficient to adequately serve the park needs.

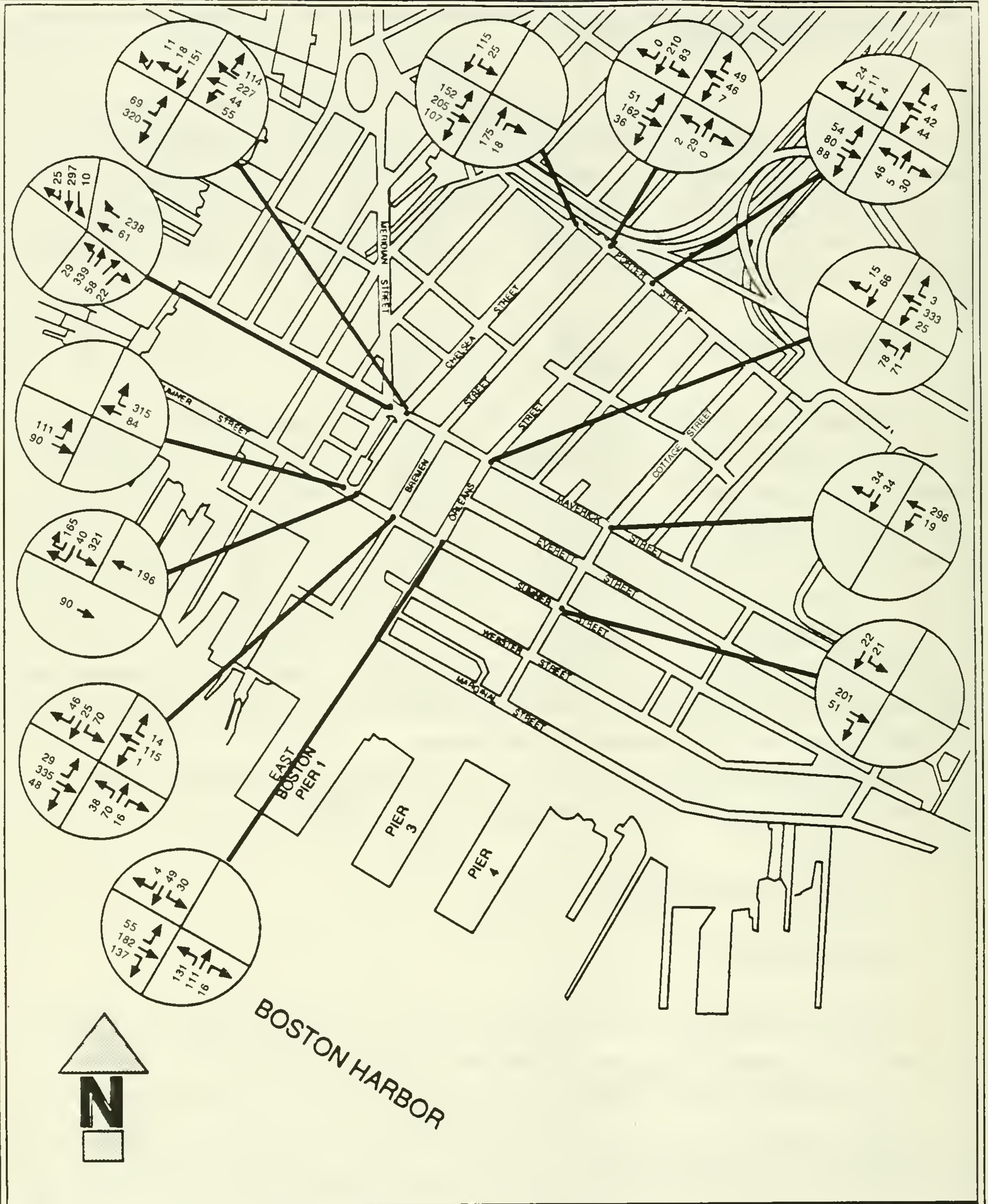


FIGURE 5.3–8

FULL BUILD (1992) AM PEAK HOUR VOLUMES

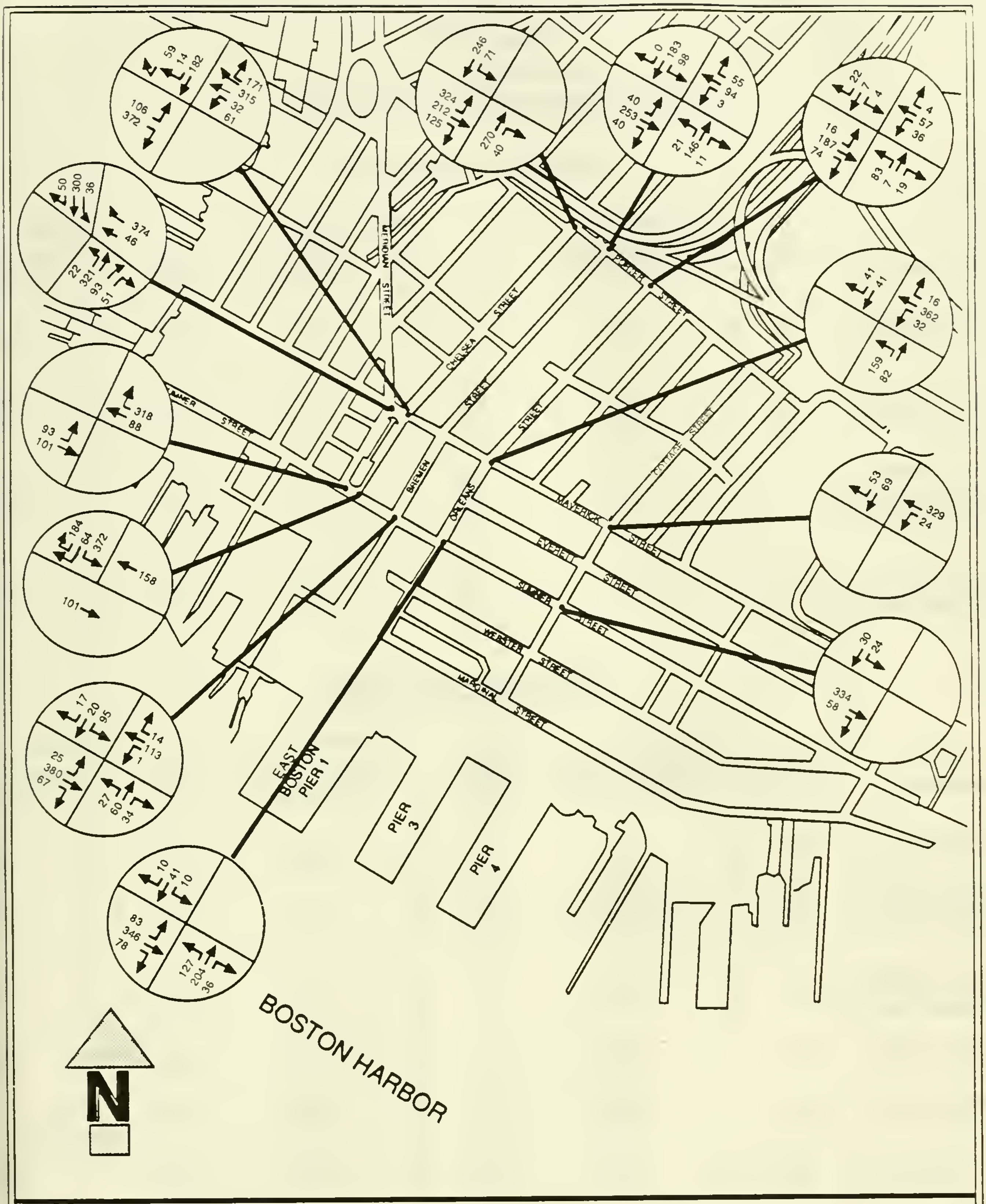


FIGURE 5.3–9
FULL BUILD (1992) PM PEAK HOUR VOLUMES

TABLE 5.3-5

1992 BUILD PEAK HOUR

INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

		1988 Existing			1992 No-Build			1992 Build		
	Intersection	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Del (Sec/Veh)
1)	Chelsea Street	AM	B	11.9	AM	B	13.3	AM	B	13.7
	@ Porter Street	PM	C	17.9	PM	C	20.2	PM	C	21.5
2)	Porter Street	AM	B	6.6	AM	B	7.0	AM	B	7.0
	@ Orleans Street	PM	B	7.0	PM	B	7.2	PM	B	7.2
3A)	Sumner Street	AM	C	16.4	AM	C	20.6	AM	C	20.7
	@ Maverick Square	PM	C	15.5	PM	C	19.3	PM	C	20.7
	(Meridian Street)									
3B)	Sumner Street	AM	B	11.4	AM	B	12.1	AM	B	12.5
	@ Maverick Square	PM	B	11.9	PM	B	13.2	PM	B	13.7
	(Chelsea Street)									

UNSIGNALIZED INTERSECTIONS
(Most Constrained Traffic Movement)

		1988 Existing			1992 No-Build			1992 Build		
	Intersection	Peak Hour	LOS	Reserve Capacity (Vehicles)	Peak Hour	LOS	Reserve Capacity (Vehicles)	Peak Hour	LOS	Reserve Cap (Vehicles)
4)	Bremen Street	AM	A	465	AM	B	362	AM	B	347
	@ Porter Street	PM	B	302	PM	D	189	PM	D	184
5A)	Maverick Street	AM	B	307	AM	E	55	AM	E	48
	@ Maverick Square	PM	C	225	PM	F	-7	PM	F	-23
	(Meridian Street)									
5B)	Maverick Street	AM	B	354	AM	C	222	AM	D	197
	@ Maverick Square	PM	D	168	PM	E	62	PM	E	45
	(Chelsea Street)									
6)	Maverick Street	AM	A	520	AM	A	423	AM	A	403
	@ Orleans Street	PM	A	502	PM	B	313	PM	C	260
7)	Maverick Street	AM	A	685	AM	A	660	AM	NOT	
	@ Cottage Street	PM	A	599	PM	A	565	PM	IMPACTED	
8)	Sumner Street	AM	A	516	AM	B	381	AM	B	353
	@ Bremen Street	PM	B	381	PM	C	261	PM	C	251
9)	Sumner Street	AM	A	585	AM	A	451	AM	A	420
	@ Orleans Street	PM	A	456	PM	C	261	PM	C	202
10)	Sumner Street	AM	A	681	AM	A	660	AM	NOT	
	@ Cottage Street	PM	A	562	PM	A	535	PM	IMPACTED	

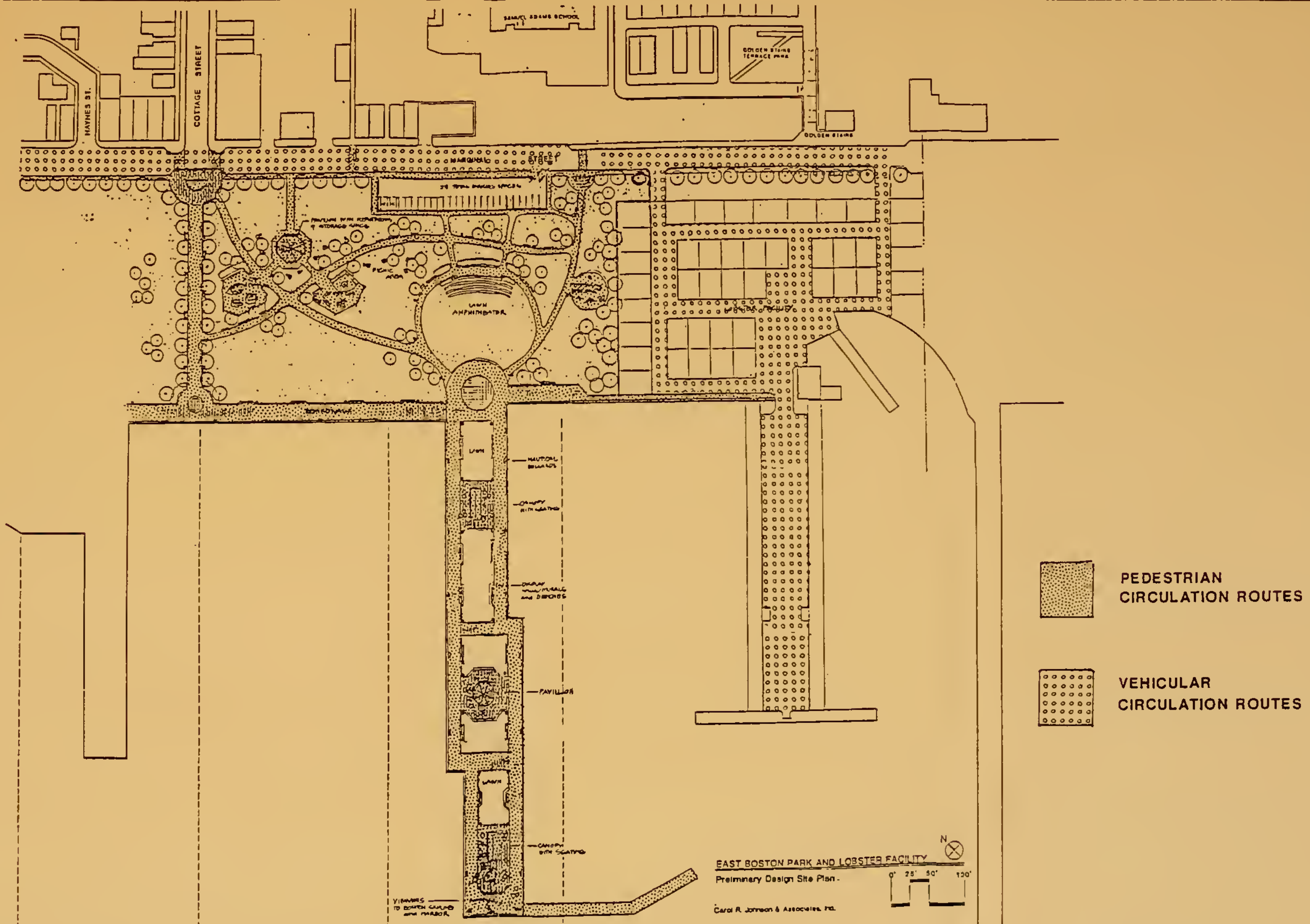

SAMUEL ADAMS SCHOOL
GOLDEN STAIRS TERRACE PARK
GOLDEN STAIRS
HAYNES ST.
COTTAGE STREET
MARGINAL STREET
PAVILION WITH RESTROOMS & STORAGE SPACE
PICNIC AREA
LAWN AMPHITHEATER
BOARDWALK
LAWN
NAUTICAL BOLLARDS
CANOPY WITH SEATING
DISPLAY WALL/MURALS AND BENCHES
PAVILION
LAWN
CANOPY WITH SEATING
VIEWERS TO BOSTON SKYLINE AND HARBOR
EAST BOSTON PARK AND LOBSTER FACILITY
Preliminary Design Site Plan -
Carol R. Johnson & Associates, Inc.
N
0' 25' 50' 100'
PEDESTRIAN CIRCULATION ROUTES
VEHICULAR CIRCULATION ROUTES

FIGURE 5.3-10
SITE CIRCULATION

1)

2)

3

3

4)

5

5

6)

7)

8)

9)

1

On the Lobster Terminal site, parking facilities are provided for the lobstermen accommodated by the 44 slips. Two parking spaces are provided for each slip. One of these is to be located directly at the individual work area allocated for each user. The remaining space will be located in a small parking lot directly off Marginal Street. This arrangement will enable the primary user to drive his vehicle close enough to the work site to avoid unnecessary advance equipment unloading, while providing a space for an associate as well.

Pedestrian Circulation

Pedestrian circulation has been an important component of the Lobster Terminal and Park planning process. A careful balance between maximization of public waterfront access and the promotion of public safety has been a paramount concern in the project access design.

The waterfront park includes a pathway system with two entry points from Marginal Street. At both locations, crosswalks will be provided to enhance pedestrian safety. The pathways connect the various uses within the park to the waterfront area, as shown in Figure 5.3-10.

Due to the active nature of the lobstering process as well as security concerns, this public accessibility to the waterfront cannot be continued into the Lobster Terminal area. Pedestrian circulation on the Lobster Terminal site itself has been designed for the efficiency and safety of tenants and users, as shown in Figure 5.3-10, with communal pedestrian corridors linking all the various elements of the lobstering operation.

5.3.6 Traffic Impact Summary

The proposed Lobster Terminal and Waterfront Park is a low impact project with a scale which will allow suitable access without undue negative impacts on the surrounding transportation system. As has been presented, the expected vehicular trips generated by the project are not sufficient to necessitate any major changes to the surrounding street network.

- Vehicular Trip Generation – The estimated number of trips generated by the proposed project total 271 daily trips. Of these, 52 (45 in, 7 out) will occur during the AM peak hour and 57 (7 in, 50 out) during the PM peak hour.

- Intersection Levels of Service – Only two intersections in the study area have been found to operate at less than acceptable levels of service under the worst case scenario. The intersection of Maverick Street at Maverick Square (Meridian Street) was found to operate at LOS "E" during the AM peak hour and at LOS "F" during the PM peak hour under No-Build conditions. It is expected to remain at LOS "F" during the PM peak hour under Build conditions. The intersection of Maverick Street at Maverick Square (Chelsea Street) can be expected to operate at LOS "E" during the PM peak hour under No-Build conditions. Under Build conditions, it can be expected to maintain this level of service. Although this intersection declines in operation due to this project under AM peak conditions, Level of Service will still be acceptable, with operations at LOS "D".

- Parking – Adequate parking has been provided for both scenarios for the Lobster Terminal and for the Waterfront Park. The 25 spaces provided for the latter is designed to serve the local community. The Lobster Terminal will provide a total of 88 parking spaces for cars.

- Non-Peak Traffic Impacts – The expected non-peak traffic impacts of the project are anticipated to occur in early morning (5:00 – 7:00 AM) and mid-afternoon (2:00 – 5:00 PM). Given the small number of new trips expected to be generated by the project, these impacts should be minimal.

- Traffic Impacts: Effect on Future Expansion – The analysis of traffic generated by the Lobster Terminal and Waterfront Park shows that the total trip generation each day at the peak hours from this project is minimal. The project's ADT of about 271 vehicle trips to and from the site represents a very small increment to the anticipated 1992 total No-Build volumes on the surrounding street network. Because the traffic generated from this project is low, peak hour conditions at area intersections are not substantially changed by its development. The two Maverick Street intersections showing poor operation have been recommended for signalization in earlier environmental analyses to improve traffic flow.

Because the Lobster Terminal and Waterfront Park project generates a low volume of daily traffic, the traffic impacts from this development alone do not appear to impose a limitation on future expansion at the piers. With the exception of the two intersections mentioned above, the service conditions in the area of the piers at the PM peak fall well within the acceptable range.

Options for feasible development of the Phase II area of the piers are currently under study. Development options are being tested for their design, engineering, traffic, and financial implications. Because of the importance attached by Massport and the East Boston community to traffic impacts related to new development, the traffic generated by different use mixes will be an important component in determining the feasibility of alternatives and in defining preferences for future activities on Piers 1 and 3 and their associated backland.

Phase II development of the piers will not commence for several years. The process envisioned to accomplish any new uses on the site includes:

1) Completion of the feasibility study;
2) Preparation of a developer's kit including a program of preferred uses;
3) Designation of a developer and negotiation of a ground lease;
4) Completion of an EIR for Phase II development and meeting other regulatory requirements;
5) Final design approval; and
6) Construction.

The feasibility study is currently focused on a preliminary analysis of alternative use programs. The results of this analysis will allow for more detailed evaluation of different schemes in order to determine which of those meet the criteria set by Massport and the East Boston community for acceptable development. Those options that meet feasibility criteria (one of which specifies that options must work from a traffic perspective) will be subject to further refinement and analysis before a recommended use program is identified.

The environmental review work required for Phase II development will include Phase I traffic in the background conditions. In addition, changes occurring in the interim period in traffic patterns, roadway conditions, new roadways provided, and any other pertinent conditions will also be reflected in the EIR traffic analysis undertaken at that time.

It should be noted that the City of Boston is currently studying the use of the Conrail right-of-way as a location for a bypass connection road from the waterfront to Route C-1. Were this roadway to be built, it would offer substantial new roadway capacity in the vicinity of the piers. A decision as to whether this roadway will be built should have occurred by the time the environmental studies for Phase II have commenced.

5.3.7 Mitigation Measures

Due to the size and nature of the proposed project, the traffic impacts associated with it will be minimal. Only one intersection, Maverick Street at Maverick Square, will, at project completion, be operating at an unacceptable level of service. Other projects in the MEPA process, Clippership Wharf and Boston Marine Works, have identified this location for signalization, as was described under No-Build Conditions. Such mitigation would greatly improve the operation of this intersection.

TABLE 5.3-5
1992 BUILD PEAK HOUR
INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

		1988 Existing			1992 No-Build			1992 Build		
	Intersection	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)
1)	Chelsea Street @ Porter Street	AM	B	11.9	AM	B	13.3	AM	B	13.7
		PM	C	17.9	PM	C	20.2	PM	C	21.5
2)	Porter Street @ Orleans Street	AM	B	6.6	AM	B	7.0	AM	B	7.0
		PM	B	7.0	PM	B	7.2	PM	B	7.2
3A)	Sumner Street @ Maverick Square (Meridian Street)	AM	C	16.4	AM	C	20.6	AM	C	20.7
		PM	C	15.5	PM	C	19.3	PM	C	20.7
3B)	Sumner Street @ Maverick Square (Chelsea Street)	AM	B	11.4	AM	B	12.1	AM	B	12.5
		PM	B	11.9	PM	B	13.2	PM	B	13.7

– Continued –

TABLE 5.3-5 (Continued)

UNSIGNALIZED INTERSECTIONS
(Most Constrained Traffic Movement)

		1988 Existing			1992 No-Build			1992 Build		
	Intersection	Peak Hour	LOS	Reserve Capacity (Vehicles)	Peak Hour	LOS	Reserve Capacity (Vehicles)	Peak Hour	LOS	Reserve Capacity (Vehicles)
4)	Bremen Street @ Porter Street	AM	A	465	AM	B	362	AM	B	347
		PM	B	302	PM	D	189	PM	D	184
5A)	Maverick Street @ Maverick Square (Meridian Street)	AM	B	307	AM	E	55	AM	E	48
		PM	C	225	PM	F	-7	PM	F	-23
5B)	Maverick Street @ Maverick Square (Chelsea Street)	AM	B	354	AM	C	222	AM	D	197
		PM	D	168	PM	E	62	PM	E	45
6)	Maverick Street @ Orleans Street	AM	A	520	AM	A	423	AM	A	403
		PM	A	502	PM	B	313	PM	C	260
7)	Maverick Street @ Cottage Street	AM	A	685	AM	A	660	AM	NOT IMPACTED	
		PM	A	599	PM	A	565	PM		
8)	Sumner Street @ Bremen Street	AM	A	516	AM	B	381	AM	B	353
		PM	B	381	PM	C	261	PM	C	251
9)	Sumner Street @ Orleans Street	AM	A	585	AM	A	451	AM	A	420
		PM	A	456	PM	C	261	PM	C	202
10)	Sumner Street @ Cottage Street	AM	A	681	AM	A	660	AM	NOT IMPACTED	
		PM	A	562	PM	A	535	PM		

TABLE 5.3–6
PHASE II BUILD PEAK HOUR INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

		1992 No–Build			1992 Build			1992 Build Phase II		
	Intersection	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)
1)	Chelsea Street @ Porter Street	AM PM	B C	13.3 20.2	AM PM	B C	13.7 21.5	AM PM	F F	117.1 73.4
2)	Porter Street @ Orleans Street	AM PM	B B	7.0 7.2	AM PM	B B	7.0 7.2	AM PM	B B	7.7 7.7
3A)	Sumner Street @ Maverick Square (Meridian Street)	AM PM	C C	20.6 19.3	AM PM	C C	20.7 20.7	AM PM	D F	25.6 81.7
3B)	Sumner Street @ Maverick Square (Chelsea Street)	AM PM	B B	12.1 10.2	AM PM	B B	12.5 13.7	AM PM	F C	127.7 19.6

– Continued –

TABLE 5.3-6 (Continued)

UNSIGNALIZED INTERSECTIONS
(Most Constrained Traffic Movement)

	Intersection	1992 No-Build			1992 Build			1992 Build Phase II		
		Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)	Peak Hour	LOS	Average Delay (Sec/Veh)
4)	Bremen Street @ Porter Street	AM	B	362	AM	B	347	AM	D	168
		PM	D	189	PM	D	184	PM	E	59
5A)	Maverick Street @ Maverick Square (Meridian Street)	AM	E	55	AM	E	48	AM	F	–212
		PM	F	–7	PM	F	–23	PM	F	–215
5B)	Maverick Street @ Maverick Square (Chelsea Street)	AM	C	222	AM	D	197	AM	F	–85
		PM	E	62	PM	E	45	PM	F	–105
6)	Maverick Street @ Orleans Street	AM	A	423	AM	A	403	AM	B	386
		PM	B	313	PM	C	260	PM	F	–282
7)	Maverick Street @ Cottage Street	AM	A	660	AM	NOT IMPACTED		AM	NOT IMPACTED	
		PM	A	565	PM			PM		
8)	Sumner Street @ Bremen Street	AM	B	381	AM	B	353	AM	E	45
		PM	C	261	PM	C	251	PM	D	135
9)	Sumner Street @ Orleans Street	AM	A	451	AM	A	420	AM	F	–36
		PM	C	261	PM	C	202	PM	F	–405
10)	Sumner Street @ Cottage Street	AM	A	660	AM	NOT IMPACTED		AM	NOT IMPACTED	
		PM	A	535	PM			PM		

SECTION 6.0
TIDELANDS ISSUES

6.0 TIDELANDS ISSUES

The following chapter responds to the requirement of the scope to address the tidelands issues at East Boston Piers 1 through 5 (the Piers). Chapter 349, Section 7 of the Acts of 1986 states that the provisions of Chapter 91 of the General Laws shall apply to any development undertaken on the Piers.* These provisions include the characterization of the tidelands at the Piers, the future uses proposed for the Piers, and the relationship between proposed uses and the objectives of Chapter 91.

6.1 Tidelands Identification

The methodology used to draw conclusions on the extent and type of tidelands at the Piers combines the research and analysis of historical documents, local cartography, hydrography and standard coastal engineering/surveying techniques. Historical reports and documentation provide a useful background history of the uses and development of coastal areas, explaining the context of changes in the coastal shorelines or the placement of structures and/or fill in a particular tideland area. Historical cartographic and hydrographic information can provide evidence of former shoreline configurations and upland/tideland boundaries. The existence of Chapter 91 Waterways License Plans and historical site surveys describing coastal engineering structures (such as breakwaters, seawalls and wharfs) provides accurate information on the location, principal dimensions, time of construction and purposes for which structures were built.

The practical application of these technical analyses, using the best available historic information, allows the researcher to construct an accurate history of changes in the shoreline configuration of tideland areas. This information can then be used to determine how the provisions of Chapter 91 may apply here.

Consistent with DEQE Waterways Regulation Program expectations, the following sources of information were used to locate and research the available information to determine the extent and type of tidelands at the East Boston Piers site:

---

* Chapter 91 of the Massachusetts General Laws and the regulations promulgated under 310 CMR 9.00, the Waterways Regulation Program, administered by the Department of Environmental Quality Engineering - Division of Wetlands and Waterways Regulation Section.

- Department of Environmental Quality Engineering (DEQE), Division of Wetlands and Waterways Regulation, Chapter 91 Waterways Regulation Program
- Massachusetts State Archives
- Suffolk County Registry of Deeds
- State House Library – Special Collections
- Bostonian Society
- Boston Public Library – Rare Books Section
- City of Boston Survey and Records Department

6.1.1 Extent and Type of Tidelands

The Chapter 91 regulations governing the administration of waterway licenses distinguish between Commonwealth tidelands and private tidelands. The public's rights in Commonwealth tidelands are more extensive than their rights in private tidelands.

Commonwealth tidelands are defined as:

> all tidelands lying seaward of the natural low water mark or 100 rods seaward of the natural high water mark, whichever is farther landward; and ... in ... any location where title to tidelands is not held by a private party, all tidelands lying seaward of the natural high water mark. These tidelands are held by the Commonwealth in trust for the benefit of the public or held by another party by license or grant of the Commonwealth subject to an express or implied condition subsequent that they be used for a public purpose.

Private tidelands are:

> held by parties other than the Commonwealth subject to an easement which reserves for the public the rights of fishing, fowling, navigation and their natural derivatives and of passing freely over and through the water.

The DEQE Waterways Regulation program has the responsibility of regulatory review and authorization of any new structures or changes in use or structural alterations of any previously authorized structures and/or fill placed in tidelands. The extent of DEQE's substantive and procedural review under Chapter 91 for proposed work in tideland areas is largely dependent on the type of tidelands involved (i.e., Private or Commonwealth Tidelands) and the areal extent of tidelands at the project site. DEQE has statutory jurisdiction under Chapter 91 in both previously filled and presently tide-flowed tidelands. Therefore, it is essential to determine the landward limit of Chapter 91 jurisdiction in previously filled tideland areas and the type of tideland areas involved. The former allows DEQE to confirm the landward limit of Chapter 91 jurisdiction. The latter allows DEQE to establish the level of its public trust responsibility and the level of public benefits which must be provided in these tideland areas.

Under the Chapter 91 statute, both Phase I and Phase II development will constitute a change in use and structural alteration of previously licensed structures and fill in tideland areas at the site. The landward limit of filled natural tidelands at the project site is the line shown on Figure 6-1. This location is based upon research and analysis of the best available historical information, as well as the Chapter 91 Waterways Licensing history for work in tidelands at the Piers. The best source found for the location of the earliest known shoreline was a map of Boston Harbor published by the U.S. Coast and Geodetic Survey in 1935. This map is currently used as a reference by the DEQE for locating the original Boston Harbor shoreline. The Department of Public Works drew a line on the map indicating the earliest known shoreline as compiled by surveys of Henry Perham (1775), A.S. Wardsworth (1817), John G. Hale (1813), and the U.S. Coast Survey (1847). Additional maps were found indicating an original shoreline lying southwest of this line. The topographic relief of the area and rock outcrops indicate that this other line may be 50 to 100 feet inland of the earliest known shoreline indicated on the DPW reference map. However, it is important to note that all of the sources found indicated a shoreline northeast of Marginal Street. Since the Piers' boundary is on the southwest site of Marginal Street, the entire site is located within tidelands or former tidelands.

Once tideland areas have been determined to be present on a project site, it is important to identify their status as either Commonwealth tidelands or private tidelands. Different standards apply to the tidelands in accordance with their status.

The delineation of private and Commonwealth tidelands is done by locating the historic extreme low water shoreline. Tidelands landward of this low water line or 100 rods from the historic highwater line are defined as private tidelands; land seaward of the line is considered Commonwealth tidelands.

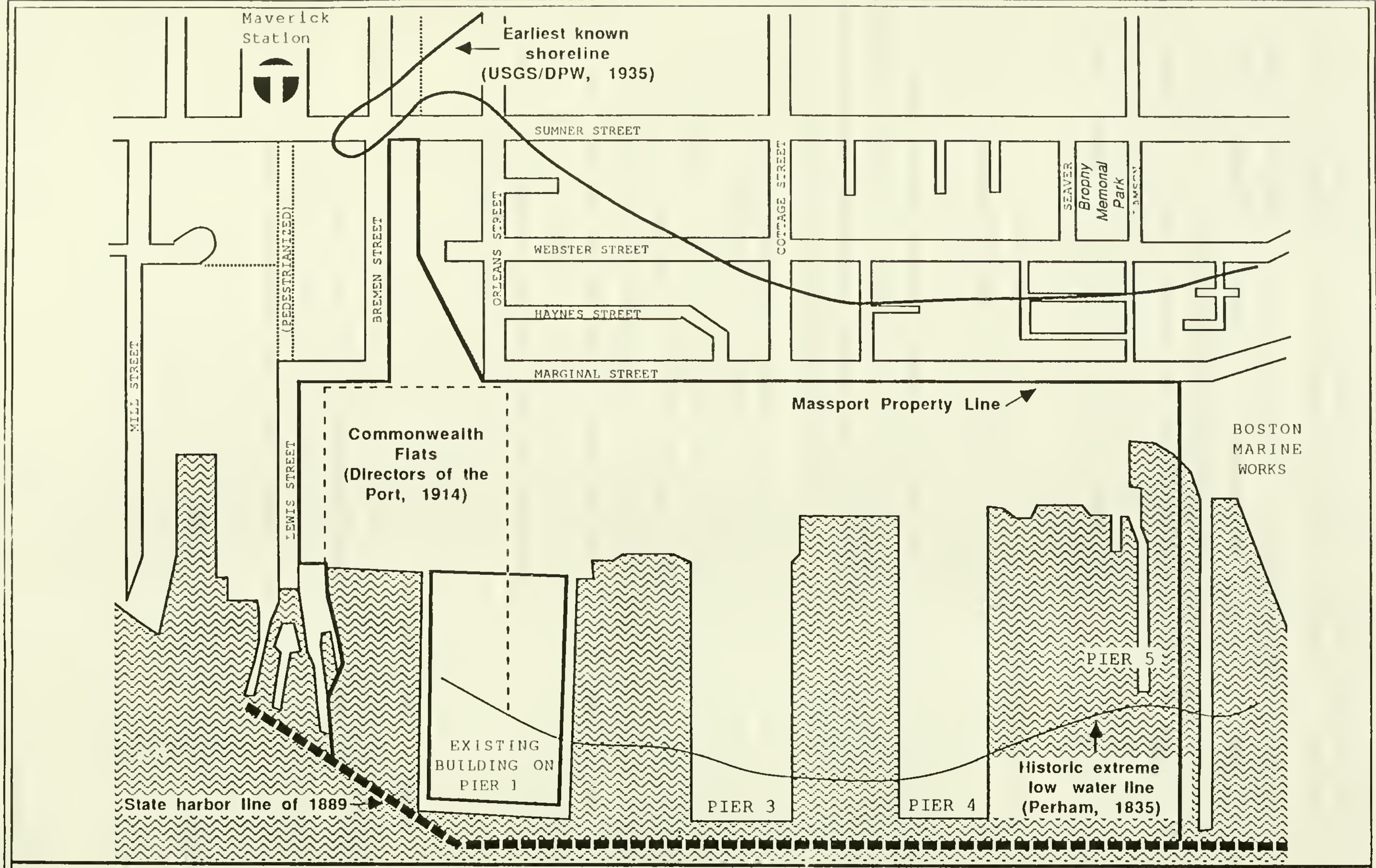


FIGURE 6–1

LOCATION OF EARLIEST KNOWN SHORELINE AND HISTORIC EXTREME LOW WATER LINE

The most conclusive evidence of the location of the historic extreme low water line was found in the DEQE files. A Harbor and Lands Commission's License No. 3394 (Appendix D) shows, in a scaled plan of the East Boston Piers, a delineation of the historic extreme low water line as defined by the Perham Survey of 1835 (see Figure 6-1). Two other licenses with the Perham Survey on it were located for an adjacent site and another site in East Boston. The DEQE references the U.S. Coast and Geodetic Survey Map for the original shoreline, and has traditionally relied on approved waterways license plans such as these for the most accurate information delineating historic shoreline positions for purposes of defining Chapter 91 jurisdiction.

The data presented and discussed here on the extent and type tidelands on the East Boston Piers suggests that:

- The land areas of the East Boston Piers consist entirely of previously filled private tidelands;
- The pier areas consist primarily of previously filled private tidelands (74%), with a portion of previously filled Commonwealth tideland (26%); and
- The watersheet areas consist of both flowed private (59%) and flowed Commonwealth tidelands (41%).

6.2 Proposed Activities Within Tidelands Areas

The redevelopment of the East Boston Piers has been programmed in two phases. Phase I of the project, which is the subject of this DEIR, is specifically defined as to proposed land uses. Phase II of the project has begun in the form of a feasibility study. The property is considered as a single entity, undergoing a phased development.

Since the entire property is classified as tidelands, all development proposed at the Piers will be subject to the provisions of Chapter 91 in accordance with Section 7 of Chapter 349.

Phase I development includes work in private tidelands, both filled and tide flowed. None of the proposed new development occurs within Commonwealth tidelands. A portion of the Pier 4 deck which extends into Commonwealth tidelands will be removed, but that is the only activity contemplated for Commonwealth tidelands in the Phase I portion of the Piers development.

Private tidelands development includes:

- Construction of a Lobster Facility - Construction of the lobster facility will entail the repair of the existing bulkhead where it has deteriorated, and improvement of the land area to create paring, storage and work areas. Under the expanded Alternative, the construction of a holding facility would also take place.

- Construction of a Waterfront Park - Construction of the waterfront park will include the repair of the existing bulkhead on the waterfront side of the park in addition to grading, landscaping and placement of park elements. Several minor structures will be located on the site.

- Removal and Repair of Piers - The existing Pier 5 will be removed since it is structural unsound. The pile-supported deck on Pier 4 will also be removed, exposing the existing core. The core and bulkheads of Pier 4 will be repaired for passive recreational use associated with the waterfront park.

- Replacement of Piers - A replacement for Pier 5 will be constructed in conjunction with the proposed Lobster Terminal to provide a docking facility for the lobster boats. Dredging will be performed around the new Pier 5 to provide a minimum 15-foot depth at mean low water; some filling associated with land stabilization is also proposed. This work is discussed in more detail in Section 5.1 of this Draft EIR.

Phase II development contemplates retention of the existing Piers 1 and 3, and new construction on Pier 1 and the backland. The water's edge will receive particular attention and treatment. It is anticipated that current tenants engaged in water dependent activities (not the lobstermen who will be moved to the Phase I lobster terminal) who wish to remain at these Piers will be given priority to lese space within the proposed Phase II development.

6.3 Recognition of Chapter 91 Policies and Standards

The provisions of Chapter 91 indicate that DEQE must make certain findings in its role as a license granted agency. The requirements are that a project must either be dedicated to a water dependent use or otherwise serve a proper public purpose. In determining the extent of proper public purpose DEQE seeks to ascertain that a proposed project provides a greater public benefit than detriment to the pubic's rights in tideland and is also consistent with the policies of the Office of Coastal Zone Management. Regulations which will establish the criteria for these findings are under preparation.

The following section describes the historic, existing and proposed uses at the Piers and in particular their water dependent status.

Historic Uses of East Boston Piers

The East Boston Piers were acquired by Massport in 1956 as part of the original port properties. At that time, they consisted of three closed and one open pier dominated by a million bushel grain elevator and supporting facilities. In 1970, Massport assumed operation of these facilities and subsequently demolished the grain elevator, the water tower, and other structures on Piers 3 and 4. All non-essential trackage was also removed. With the final docking of a Moore-McCormick line vessel in January, 1976, the Piers officially closed for cargo purposes.

Over the hundred years or so when the Piers were used for a variety of shipping, cargo handling and rail transshipment purposes - all water dependent uses - different buildings and facilities were constructed, demolished and rebuilt to accommodate changes in cargo handling technology and in the transportation infrastructure. By the late 1970's, the limits of the rail connections and the use of rail in cargo transshipment, the inadequacy of the roadway connections and the limitations of the Piers and backland configuration and the proximity of a residential neighborhood all contributed to the decisions that the shipping lines and Massport made to discontinue shipping activity at the Piers.

Concurrent with this closure, Massport's 1976 Logan Master Plan set forth a policy for reuse of the Piers. The Plan states "These Piers have inadequate access and hinterland for any major port use today. Massport piers and waterfront property in East Boston are not needed for seaport activities, which can be better accommodated at other harbor locations. The best use of the land is for residential, recreational or other purposes related to the development of the East Boston community."

This policy of the Massachusetts Port Authority was reinforced when, in 1977, the Coastal Zone Management Office did not include the East Boston Piers as one of the Commonwealth Designated Port Areas regulated by the legislation. As a result of its own policy and of the State's recognition that the East Boston Piers were not suitable for modern port facilities, Massport made a series of decisions to locate new facilities elsewhere in Boston Harbor to accommodate the expansion and growth of the Seaport.

During the following five to 10 year period, Massport invested heavily in its Seaport facilities on the other side of the Harbor. Massport expanded the Moran Container Terminal in Charlestown, built the Conley Terminal in South Boston and completed the 37 acre fill project at the South Boston Naval Annex. Each of these projects was subject to public review and comment as they proceeded through the State's environmental processes prior to their construction.

Existing Uses at East Boston Piers

Of the thirty-two tenants currently renting space at Piers 1 and 3, 19 are active water dependent uses, 11 of which are lobstermen who will move to the new terminal on Pier 5. The other eight tenants engaged in water dependent activities will be offered the opportunity to lease space in the Phase II development thereby enabling them to invest in and expand their businesses. The remaining 13 tenants are engaged in non-water dependent activities.

The backland area is not in use and its condition varies considerably from the large paved parking area to the unpaved and overgrown area abutting the residential neighborhood along Marginal Street. There is no water-dependent activity associated with the unused portions of the Piers site.

Proposed Uses at East Boston Piers

The proposed uses for the Piers include a combination of both water-dependent and non water-dependent uses. The entire Phase I development is dedicated to water dependent uses which include public access and commercial fishing. Those water dependent uses remaining after the lobstermen have moved to Pier 5 are expected to continue within the Phase II portion of the project. The Lobster Terminal and Waterfront Park are both dependent on their waterside locations to serve the functions they are being designed to meet.

The proposed Phase I project consists of a lobster terminal and a waterfront park. The lobster terminal, comprising 2.9 acres of the project site and 7.8 acres of watersheet, is a water-dependent use. The lobstermen need a pier to tie up their boats and land area for the storage of their gear and lobsters. The survival of this industry is dependent upon the use of and proximity to Boston Harbor's waterfront. Its survival is also dependent upon the provision of a long-term designated safe berthing area on the Boston Harbor and is mandated by Legislation.

The waterfront park, comprising 6.4 acres of the Pier site, is also water-dependent. The character of the park is designed to relate to the waterfront and is a water enhanced use providing needed public access for residents of East Boston as well as residents of the region.

Since the provision of public access to the waterfront is one of the important interests protected by Chapter 91, a park enhancing passive public enjoyment and use of the waterfront is an appropriate use for this area.

The inclusion of the core of Pier 4 as a park element provides an additional opportunity to utilize the Boston Harbor waterfront. The boardwalk along the perimeter of the site extends along the pier and along a portion of the lobster terminal parcel to facilitate observation of the lobstering operations and the harbor area. In addition, water-dependent and water-related elements have been incorporated into the park design. Water-related exhibits are planned along the pier area for public education and enjoyment, and the wave fence planned to extend from Pier 4 for protection of the lobstering fleet will be utilized as a fishing pier.

Other water-dependent activities were considered throughout the design of this park. In particular, a community boating program was reviewed in detail. Based upon discussions with community boating personnel, it was determined that this site would only be appropriate for a small number of advanced adult boaters due to safety constraints. This type of program could be accommodated between Piers 3 and 4; no recreational boating should occur between Piers 4 and 5 in order to avoid navigational conflicts with the lobstermen. The cost for this type of program is significant; subsidization is required in order for it to be affordable to the public. For this reason, and because it currently appears that this type of service will be provided in a nearby location, it was agreed that this type of program should be reviewed again in the context of Phase II.

DEQE's determination of whether a non water-dependent use of tidelands services a proper public purpose depends on two principal factors: 1) the type of tideland being used for the non water-dependent use, i.e., Private vs. Commonwealth Tidelands, and 2) the degree of public benefits provided according to the extent of public rights in tidelands involved. The degree of public benefits, such as public access and facilities of public accommodation, is directly measured by the extent of public rights in the tideland area.

As previously discussed, the Phase I work (except for some pier demolition) will occur only within filled and flowed Private Tidelands. Consequently the public rights in these tidelands are limited to purposes serving navigation, free fishing and fowling, and the passing freely over and through the water.

For Phase II development on Piers 1 and 3, the uses will likely encompass both water dependent and non-water dependent uses. Taken as a whole the contribution of the Piers projects to the observance of the objectives of Chapter 91 will be very substantial. The improvements proposed and contemplated will offer significant regional and neighborhood amenities where none now exist; will introduce a new economic development opportunity to East Boston; will enable the lobster industry to survive and thrive; and will resolve several land use and environmental issues that have been outstanding for many years. In sum, the public benefits anticipated by the Phase I and II developments will significantly outweigh any detriment to the public's rights in these tidelands.

The following section describes in detail how the projects proposed for Phase I development are consistent with the Coastal Zone Management Plan for Boston Harbor.

CZM Consistency

The Lobster Terminal and Park project is consistent with the policies of the Massachusetts Coastal Zone Management Program, as described below.

Regulatory Policies

- Policy 1: Protect Ecologically Significant Resource Areas – The project is not located in or on any saltmarsh, shellfish bed, dune, beach, barrier beach, or salt pond.

- Policy 2: Protect Marine Resource Areas – The project is not located in any area for preservation or restoration or area of critical environmental concern.

- Policy 3: Consistency with Water Quality Standards and Effluent Limitations – A Water Quality Certification permit will be obtained from the DEQE for the proposed work in waters of Boston Harbor. No discharge of effluent is proposed into Boston Harbor.

- Policy 4: Minimize Interference with Water Circulation and Sediment Transport: Preserve Water Quality and Marine Productivity – Construction in Boston Harbor will be contained by debris shrouds/silt curtains. Impacts will be localized and temporary. Open-pile structure will cover less of an area than currently exists, which minimizes impacts on water circulation and sediment transport. Mitigation measures will minimize short-term water quality and marine productivity impacts. In the long-term, there will be no negative impacts. In fact new pilings will provide additional marine habitat for shellfish/algae.

- Policy 5: Minimize Adverse Effects on Dredging and Disposal of Dredged Materials – Through the use of mechanical dredge, the most efficient means, and water tight scows, turbidity will be minimized. Siltation curtains/debris shrouds will be employed, if necessary. Any turbidity associated in dredging will be localized (temporary). Time of year restrictions will be employed to minimize shellfish/finfish spawning impacts.

- Policy 7: Encourage Commerce and Development in Designated Port Areas: Prevent Exclusion of Maritime-Dependent Uses – The East Boston Piers are not a Designated Port Area in Boston Harbor. The Piers have been recognized as not appropriate for large scale Seaport activities both by the CZM and by Massport. Growth of the Seaport facilities and activities is accommodated in more appropriate locations in South Boston and Charlestown.

- Policy 10: Consistency with Laws Regarding Air and Water Pollution Control, Surface Waste Discharge and Wetlands Protection – A state water quality certificate and federal approval from the Corps of Engineers will be obtained for work in the Boston Harbor. An Order of Conditions will be obtained from the Boston Conservation Commission for work in and within 100 feet of wetland resources. A sewer connection permit will be obtained from the Massachusetts Division of Water Pollution Control. Air pollution permit or approval requirements are not applicable.

Non–Regulatory Policies

- Policy 18: Compatibility with Community Character and Scenic Resources – This project has undergone extensive public and agency review, as described in Section 3.0 of this Draft EIR. The proposed uses provide a balance of water–related industrial uses with neighborhood compatibility.

- Policy 20: Encourage Water–Dependent Uses in Designated Ports and Developed Harbors. Redevelopment of Urban Waterfront Expansion of Visual Access – This project includes the water–dependent lobstering use as well as the creation of public open spaces to provide opportunities for water–enhanced passive recreational use, including visual access to Boston Harbor. The Waterfront Park provides a public open space in a location that is currently deteriorated and closed to the public.

- Policy 21: Improve Public Access to Recreational Areas – The project includes the creation of public open space which will provide opportunities for passive recreational uses in a location that was previously deteriorated and closed to the public.

- Policy 22: Increase Capacity of Recreation Areas – As noted above, the project includes the creation of public open space which will provide opportunities for passive recreational uses in a location that was previously deteriorated and closed to the public.

- Policy 23: Assistance to Developers to Increase Public Access to Shoreline – This policy calls for CZM to provide technical assistance to the developers of private facilities available for public recreational use and sites that increase public access to the shoreline. Through the MEPA process, CZM will provide comments and suggestions to further refine project plans.

- Policy 24: Expand and Develop Public Recreational Facilities and Enhance Access to Such Facilities – There are currently no recreational facilities in the project area and the site is closed to the public. The waterfront park will provide a new passive recreational facility to encourage public access to the waterfront. Ample parking is provided to support this facility.

Observance of Additional Conditions related to Provisions in Chapter 91

The following section describes in detail how the projects proposed for Phase I development are in accord with additional concerns that arise in meeting the objectives of Chapter 91.

Hazards to Navigation

The proposed 44–slip lobster pier, with its wave fences, will not present a hazard to navigation. The new pier will be 475 feet long and will be located within the area bounded by existing piers, the 780–foot long Pier 4 and the 513–foot Pier 5 on the East Boston Piers site. The proposed work will:

- Not extend seaward of the State Harbor Line;

- Be 1,000 feet distant from the existing ship channel and will not impede free passage during construction or after completion;

- Not impede the lines of sight required for navigation;

- Not require the alteration of an established course for vessels in the main ship channel;

- Not extend beyond the projection of the existing Pier 4 and Pier 5 structures, or interfere with access to the adjoining Boston Marine Works area;

- Not involve the construction of a solid fill structure; and

- Not substantially interfere with the public right to safely pass upon the tidewaters of the Commonwealth in vessels.

The main shipping channel is located approximately 1,000 feet seaward of the end of Pier 5. Although this channel is used for large shipping vessels, conflicts are not expected to occur since the lobster boats, which are relatively small and easy to maneuver, will have ample room and opportunity to navigate safely in this area. This additional boat traffic will not interfere with access to adjoining areas, or interfere with maritime traffic. Section 5.2.4 discusses the potential effects on navigation due to the project. Posted signs promoting safe boating practices (no wake, 5 knots speed) will limit interaction with vessels operating nearby and with larger vessels that must utilize the shipping channel.

Any debris that might be created in the rehabilitation of the piers and bulkheads will be carefully retrieved. This will prevent flotsam from entering the shipping channel and surrounding waters and causing a hazard to navigation in the area during construction.

Structural Criteria

The proposed project involves the rehabilitation of existing structures, the removal of the pile-supported Pier 5, the construction of a new pier for a lobstering facility, the development of a waterfront park, and the provision of a floating breakwater for wave protection. One small, currently eroded area will be filled and stabilized to be consistent with the shoreline in the area. Approximately 12,000 cubic yards of material will be dredged to ensure a 15-foot mean low water level around the new lobster pier.

The use of the shipping channel by large vessels, and the intervening area by small vessels, will not result in wake damage at the site because there is ample separation area between the passing vessels and the facility (1,000 feet) for dissipation of the wake. The proposed lobster boat pier area will be protected by a floating breakwater which has been designed to reduce wave impacts on the proposed facility. In addition, Boston Marine Works will provide greater wave and wake protection from the predominant east and southeast outer harbor winds and waves, as well as incoming boats into the harbor, for the proposed lobster pier area. Figure 2-2 shows the site and location of the breakwater. A more detailed engineering description of this breakwater is included in Appendix C. In addition to providing for wave impact reduction from passing vessels, this will also protect the facility from storm waves generated by coastal storms up to the 100-year frequency event and from winds of up to 100 mph. The proposed facility will not restrict the ability to dredge any channel.

The proposed wave protection will dissipate wave energy but will not cause water stagnancy, reduce the ability of adjacent waters to flush adequately nor cause or contribute to sedimentation problems in the nearby navigation channel or anchorage. The construction cannot cause increased erosion since the area is currently bulkheaded and no coastal beaches, or salt marshes exist near the proposed project. Indeed, the repair of the bulkhead shoreline will significantly improve current conditions in the project area.

Rights of Adjacent Littoral Property Owners

No structures are proposed that will interfere with any person's right to approach the adjacent property from the sea. In evaluating whether a structure interferes with such a right, the proximity of the structure to the property line, the density of existing structures and the likelihood of future structures and increased navigational uses must be considered. There are no existing water-dependent industrial uses or recreational facilities in this area. The proposed lobster terminal and park, however, will in no way impair access to the adjacent marine services facility and in fact, will provide some wave and wake protection to the Pier 1 area of Boston Marine Works. Sufficient offset from the property line will provide for a shared access channel of adequate width on the proponent's side of the line.

Reserved Public Rights

In addition to allowing adjacent property owners to approach their properties from the sea, in the foreshore the reserved public rights are:

- The right to fishing;
- The right to fowling;
- The right to navigation.

The rights to fishing and fowling include the right to take or attempt to take fish or fowl, the right to protect their habitats and food sources, and the right to pass freely along the foreshore for these purposes. The right to navigation includes not only the right to operate watercraft, but also any activity involving transport or the loading of goods to/from such watercraft. These rights will not be infringed upon. Rather, they will be dramatically improved. The proposed waterfront park area will offer public access to these tidelands where it is now private and not permitted.

Public Lateral Access

In considering Public Lateral Access, projects which will obstruct lateral access below the high water mark must be constructed to allow for public passage in the exercise of the reserved public rights. If, due to the construction of a project, the land landward of the low water mark is eliminated (i.e., by bulkheading), lateral access should be otherwise provided by the licensee. In the case of this project, the entire shoreline has been bulkheaded since the mid-1800's. The proposed project will provide and greatly enhance public access to a portion of the Boston Harbor waterfront where it is currently not permitted.

Wetland Resources

The following wetland resource areas exist on the site:

- Land Under the Ocean
- Coastal Bank
- Land Subject to Coastal Storm Flowage

Once the plans have been finalized, Massport will submit a Notice of Intent to the Boston Conservation Commission describing the proposed improvements to the project area. Massport will perform the work proposed for this area in conformance with an Order of Conditions that will be issued by the Commission. Compliance with the Order of Conditions automatically also meets DEQE requirements at 310 CMR 9.23(3) - 9.23(10). Negative impacts to these resources will be minimal due to the proposed limited work and the industrial nature of the area. Pile driving will be conducted in a manner to reduce the amount of bottom disturbance and turbidity. The existing bulkheads and piers (coastal bank) will be maintained and improved as necessary.

SECTION 7.0
RESPONSES TO COMMENTS ON THE ENF

7.0 RESPONSES TO COMMENTS ON THE ENF

The original scope for the Draft EIR, issued on September 23, 1985, referenced several comments required to be addressed in that document. These comments were from:

1) The DEQE Division of Wetlands and Waterways Regulation; and
2) The Office of Coastal Zone Management.

This section of the Draft EIR has been provided in order to ensure that all issues have been specifically addressed. Copies of the comment letters are included in this section of the Draft EIR. Each letter has been assigned a number, as shown above. In addition, the comments within each letter are identified by sub-section numbers, located in the left margin of each page. These sub-section numbers are utilized to reference the specific comments in providing responses.

7.1 Comments from the DEQE Division of Wetlands and Waterways Regulation (DWWR)

Letter from: Charles J. Natale, Acting Chief Engineer
Date: September 12, 1985

The DWWR expressed concern regarding the extent of Chapter 91 tidelands jurisdiction on the project site. In that context, further details were requested regarding each proposed project element.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Wetlands and Waterways Regulation
One Winter Street, Boston 02108

S RUSSELL SYLVA
Commissioner

RECEIVED
SEP 16 1985
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

MEMORANDUM

TO: Nancy Baker, Associate Environmentalist, MEPA Unit

FROM: Charles J. Natale, Acting Chief Engineer, DWWR

SUBJECT: Comments on the porposed Lobster Terminal and Park at
East Boston Piers 3 and 5;
E.O.E.A. #5671

DATE: September 12, 1985

The Department has reviewed the above-subject E.N.F. and supporting documents and requests that an Environmental Impact Report be required pursuant to 301 CMR 10.04-05. In accordance with this request, we offer the following comments pursuant to G.L. Chapter 91 and its regulations; 310 CMR 09.

1. The Department's preliminary review of this project porposal has determined that East Boston Piers 1-5 are in and over filled former Commonwealth tidelands and is therefore subject to regulatory review pursuant to G.L. Chapter 91 and 310 CMR 09. Since both water-dependent (Lobster Terminal) and nonwater dependent (Waterfront Park) uses are proposed, Section 14 and Section 18 of G. L. c.91 provides that the Department must determine before a Ch. 91 license can be issued that the project proposal: 1) serves a proper public purpose, 2) provides a greater public benefit than detriment to the public's rights in tidelands and 3) is consistent with the policies of the Office of Coastal Zone Management. Since it is the responsibility of the proponent to provide a detailed analysis of how this project proposal satisfies these statutory requirements, it would therefore seem appropriate in this case for the proponent to provide this analysis through an Environmental Impact Report and the M.E.P.A. review process. .01

.02 2. The proponent should provide detailed information on the areal extent of fill on former tidelands at the site. This would include; descriptions of the site's c. 91 licensing history for all structures and fill authorized, the most landward position of record of the historic high water shoreline and the related primitive extreme low water line, and figures depicting the areal extent of historic fill placed on formerly existing tidelands. The proponent should also provide an analysis of the types of tidelands involved in the project (i.e. private and commonwealth tidelands) since this directly relates to the magnitude of the public's interest in this proposal.

Proposed Lobster Terminal

1.03 1. The proponent should provide a detailed analysis of the potential short-term and long-term impacts of eliminating various types of commercial maritime industrial shipping capabilities of this deep water access site. Deep water shipping access to landside facilities for commercial industrial maritime uses within Boston Harbor is a finite commodity and an issue has been raised concerning the impacts of eliminating any potential commercial industrial maritime shipping capabilities at this site, especially given the fact that this appears to be one of the only sites along the East Boston Waterfront which has a direct rail access link.

1.04 2. At the MEPA consultation meeting held on September 4, 1985 at Massport, it was brought out that the lobster fishermen ideally need 6 acres of landside area to provide the facilities necessary for optimal operational capabilities associated with this fishery. The proposed Lobster Terminal at East Boston will provide 3.5 acres. The proponent should provide an analysis of the types of operational constraints, if any, that would result from a facility located on the proposed 3.5 acre site versus a 6 acre site. Would a smaller site area result in split operations between the existing South Boston site and the proposed site?

1.05 3. The proponent should provide a description of the anticipated types and level of uses at the Lobster Terminal during the lobstering season and off-season which would ensure optimal use of this facility, particularly during the off-season.

Proposed Waterfront Park

1.06 1. The proponent should provide a detailed description of the location, type and quality of public access to and within the proposed waterfront park, including on and off-site parking and/or vehicular access.

1.07 2. The proponent should provide a detailed description of the types of passive and/or active recreational facilities to be provided in the proposed park, including amenities which would link land and water-based recreation at the site (i.e. fishing pier, viewing platform, etc.)

1.08 As a final comment, it is evident that the proposed Lobster Terminal and Waterfront Park are only a segment of the entire Piers 1-5 redevelopment plan and that the planning process for Pier 1 is pending completion. It is important that the proposed uses on Piers 3 and 5 i.e., Waterfront Park and Lobster Termin not be incompatable with anticipated uses of the remaining redevelopment site. The DEIR should contain a discussion of use compatability to ensure an orderly approach to redevelopment of the entire site.

In conclusion, the Department reiterates that an E.I.R. should be required for this project proposal since it would provide the information necessary for public scrutiny relating to Chapter 91 issues. We thank you for the opportunity to comment and would appreciate your notification of any future meetings or discussions on this proposal. Should you have any questions or comments, please feel free to contact me at [illegible].

cc: Meriel Hardin, Acting Director, DWWR
Carl Dierker, DEQE Legal Counsel
Gary Clayton, Deputy Director, Coastal Zone Management

CN/ie

1.01 Chapter 91 Compliance

As described in Section 6.0 of this EIR, the proposed project will be subject to the provisions of Chapter 91. Project elements have been reviewed in that section to ensure that appropriate standards are met. As described throughout Section 6, the Lobster Terminal and Waterfront Park project are water-dependent uses, and they also:

- Serve a proper public purpose;
- Provide greater public benefits than detriment to the public's rights in tidelands; and
- Are consistent with the policies of the Office of Coastal Zone Management.

By providing two water-dependent facilities, Phase I is highly beneficial to the general public and is consistent with waterfront planning efforts.

1.02 Extent and Type of Tidelands

A discussion of the extent and type of tidelands on the project site is provided in Section 6.1.1 of this EIR. As described in that section, the entire land portion of Phase I is former private tideland area, and Phase II includes both private tidelands and Commonwealth Tidelands.

1.03 Potential Impacts to Deep-Water Shipping

This issue is addressed in Section 5.2 of this EIR.

1.04 Appropriate Size of Lobster Terminal Parcel

The Lobster Terminal portion of the site is 3.5 acres. This area adequately meets all the needs associated with 44 lobstering slips, as described in Section 4.1.1.

1.05 Uses of Lobster Terminal

As described in Section 4.1.1, the Lobster Terminal has been designed to meet the needs of the lobstering industry during both active and inactive seasons. In this EIR, worst-case effects of traffic associated with the summer season have been examined. During that time, lobstermen would utilize the site for boat docking, trap storage and repair, and bait and ice supply. Winter activities would include boat and trap repair, storage of equipment and some limited fishing.

1.06 Public Access to the Waterfront Park

Public access to the Waterfront Park is described in Section 4.1.2 and illustrated on Figure 5.3-10. On-site parking for the park is also identified.

1.07 Description of Recreational Facilities

The types of passive recreational facilities proposed to be provided at the park are described in detail in Section 4.1.2. No active recreation is proposed for this site; this is due to the high wind velocity on the property and to the expressed needs of the community for a passive water-related facility.

1.08 Project Compatibility with Anticipated Users of the Remainder of the Site

As discussed in Section 3.3 and elsewhere in the text of this EIR, this project has changed since the ENF was filed. With the repositioning of the park onto Pier 4 area, the two elements of Phase I now abut one another. This significantly reduces any potential conflict with other uses on the remainder of the site. As also mentioned, a consulting team is now working with Massport and with the community to develop a plan for the remaining parcel. Due to this cooperative work between those involved with both projects, no incompatibility will result.

7.2 Comments from the Office of Coastal Zone Management (CZM)

Letter from: Richard F. Delaney, Director
Date: September 12, 1985

Comments from CZM focused on details relating to the proposed project and the site in order to assess the impacts of the Lobster Terminal and Park on the coastal zone.

COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MEMORANDUM

TO: SAM MYGATT, DIRECTOR, MEPA UNIT

FROM: RICHARD F. DELANEY, DIRECTOR

DATE: SEPTEMBER 12, 1985

RE: EOEA #5671 LOBSTER TERMINAL AND PARK

The Massachusetts Coastal Zone Management (MCZM) Office has reviewed the Environmental Notification Form (ENF) for the above referenced project which was published in the Environmental Monitor dated August 9, 1985. Based on the information provided, we recommend the preparation of an Environmental Impact Report (EIR). MCZM finds the area under consideration to be of significant size and scope to impact the water resources of the area. Therefore, we wish to review some of the more relevant issues that were not addressed adequately in the ENF. The following questions will help us determine the benefits and impacts of the proposed project on the coastal zone.

(2.01) 1. What exactly is the amount of land area which will be impacted by the proposed development project?

(2.02) a. What portion of the land area will be used for lobster related activities?

(2.03) b. Where will new structures be placed, what portion of the site will they occupy and for what purpose?

(2.04) c. What portion of the lobster site will be assigned to parking, and where will it be located in relation to the waters edge?

(2.05) d. What portion of the active lobstering area will be used for the storage, removal and packaging of the product?

2.06 2. Given that pier four is in the middle of piers three and five, what is it's present use and what are the future plans for its development?

3. What options for activities exist on pier 4 given the proposed use of the abutting piers?

2.07 4. The ENF states that 13 acres comprise the project area, however, information is only provided with regard to six acres. What is the status of the remaining seven acres?

2.08 5. Transportation issues seem to be a significant factor in the use and design of the terminal and the other piers in the area. What is the basis for the vehicle trip information provided in the ENF?

2.09 a. Is there information (estimates) on the number of trucks, size of loads, and hours of peak travel?

2.10 b. Have estimates been made to determine the impacts of expanded activities on the lobster pier during the summer or if the site becomes a major wholesale location?

2.11 c. Has a transportation analysis been done to determine the impacts of the traffic, given possible future development on the lobster site (i.e. a restuarant) or on other sites within the general area (i.e. the park, possible housing or recreational activities).

2.12 d. What are the project demands for parking and traffic over the next ten years?

6. Park site, activities and design.

2.13 a. What type of park is being proposed; active, passive or mixed use facility? Six acres is quite large and in some respects restricts a large portion of the coastal zone.

2.14 b. What other type of activities will be allowed on the site; vendors, concert programs, bikes, skateboards, etc.?

2.15 c. What type of activities will take place near the waters edge?

2.16 d. Will there be any fixed structures on the park site? What size, for what purpose, and how will they be maintained?

2.17 e. How will the park be maintained and which agency will be responsible for safety, health, and management of the site?

2.18 f. Will there be a management plan for the park?

2.19 g. What will be the hours of use and who will monitor activities to determine proper use?

2.20 h. Is there a plan to tie-in the other activities within the total site to the park?

2.21 i. What will be the transportation needs of the park? Where will vehicles and equipment be stored?

2.22 j. What is the projected use of the park and what impact will it have on transportation flow and parking within the residential community?

2.23 k. Will parking be provided within the park space? If so, how many cars and where?

2.24 l. Has there been any analyses of the area to determine the feasibility or activities within the area?

2.25 2.26 m. Are there plans to make adequate use of the deep water facilities at pier 3? What will be the relationship of the park to the water?

2.27 n. What studies have been done to determine the demand for a park within the area? How many parks exists within ¼ mile of the proposed site?

2.28 o. Are there alternative designs or uses for the park space?

7. Please define to what extent construction and dredging will take place on the site.

2.29 a. How much is to be dredged and from where?

2.30 b. Has there been test borings to determine quality of dredge materials?

(2.31) c. What has been done to determine the need for dredging?

(2.32) d. Where will the dredged material be disposed of? How will it be transported?

(2.33) e. What measures will be taken to prevent migratory contamination to surrounding areas during the dredging operation?

(2.34) f. Is there a comprehensive analysis of the benthic community and other acquatic life within the proposed dredge area?

(2.35) g. What will be done to secure the bulkhead? What type of materials will be used?

(2.36) (2.37) h. How long is the proposed construction period? Where will the debris and other material be disposed of?

(2.38) i. What are the possible impacts of construction on the surrounding community? How will noise and general activity effect the nearby public school?

(2.39) j. What water base construction activities are proposed besides the proposed dredging?

(2.40) k. What types of materials will be used in replacing the piers? Where are the designs for the proposed replacement?

(2.41) l. To what extent will the proposed construction activities effect traffic within the harbor?

8. Future uses of an area are important to the environmental soundness of proposed projects. It is therefore important to have an idea as to the proposed use of the remaining parcels within the site.

(2.42) a. Does the proposed activities for piers three and five exclude any future use of the area for other commercial and industrial activities?

(2.43) b. Has there been an evaluation of the impact of the loss of these deepwater berthing sites on the future of shipping activities within the area?

②.44 c. What portion of the proposed site can be dedicated for water dependant activities other than lobster landings?

②.45 d. Are there any other proposals for use of this area other than the park and lobster landing?

②.46 e. Has there been an area specific economic development analysis, a city wide analysis, or a regional analysis to determine the highest and best use for the area?

②.47 f. How was the proposed uses for the site chosen over other possible activities?

RFD/LAE:sla

2.01 Land Area Impacted by the Project

The total land area affected by this project is 7.3 acres; 8.3 acres of pier will additionally comprise the project's surface area.

2.02 Land Area Used for Lobster-Related Activities

Approximately 3.5 acres of land will be utilized for the lobstering facility.

2.03 Information Relating to Proposed Structures

The single structure associated with the lobstering facility is the small bait and ice house located near the water. Small sheds will also be provided for the lobstermen for storage of equipment.

The waterfront park will also involve a minimum of construction. One building will be provided, housing comfort facilities and maintenance equipment.

2.04 Lobster Site Parking

The plan for the lobstering facility, along with associated parking areas, is shown on Figure 2-2. As can be seen on that plan, parking is distributed throughout the site.

2.05 Land Area Used for Lobster Storage, Removal, and Packaging

No holding facility is proposed for this location, since this service is already proposed to be provided in close proximity to the site.

2.06 Prior Separation of Project Elements

Since the two elements are no longer separated by Pier 4, these questions are no longer appropriate. As discussed elsewhere, the design of this project and that for the remainder of the Piers is being coordinated to ensure no conflict of use.

2.07 Status of Non-Lobstering Site

See Section 6.0.

2.08 Basis for Vehicle Trip Information

The vehicle trip information cited in the ENF was not used in this analysis. Instead, as described in Section 5.3, data was collected in conjunction with the Clippership Wharf project to determine actual current volumes of traffic in the area and project a future condition. Project trips, as also described, were estimated based upon standards found in the ITE manual.

2.09 Information Regarding Truck Trips

Since no holding facility is proposed on this site, the only significant truck traffic expected to regularly travel to the lobster terminal will be pickup trucks. These vehicles present no different characteristics than standard automobiles.

2.10 Potential for Lobstering Expansion

The traffic analysis in this EIR was performed for peak summer conditions and presents a worst-case assessment of traffic impacts. With the removal of the holding facility from this location, no potential exists for this site to become a major wholesale location.

2.11 Transportation Impacts

The transportation analysis contained in Section 5.3 assesses the impacts of the total project on the surrounding roadway network. It includes in the analysis information related to other projects proposed in the vicinity of the site.

2.12 Ten-Year Parking and Traffic Projections

Parking is adequately provided for both elements of this project. It is not expected that the demand for parking will increase over time.

2.13 Type of Park

See response to Comment No. 1.07.

2.14 Types of Park Users

The park will, as defined in the legislature, be managed by the MDC. Details such as allowed uses have not yet been resolved. As a community park designed for passive enjoyment of the waterfront area, it is not expected to house users incompatible with that purpose.

2.15 Park Activities on the Water's Edge

As shown on Figure 2-3 of this EIR, the waterside of the park parcel is bounded by a promenade to enable the public to optimally visually access the waterfront. At this point, no active waterfront activities are proposed.

2.16 Park-Related Structures

See response to Comment No. 2.03.

2.17 Park Maintenance

The State legislation assigns the MDC to be responsible for park management.

2.18 Park Management Plan

At this time, no management plan has been developed; as mentioned above, the MDC is responsible for park maintenance.

2.19 Hours of Use and Enforcement

See response to Comment No. 2.18.

2.20 Relationship of Remaining Site to Park

The park has been designed to be compatible with the lobster terminal and with other potential uses on the remainder of the Piers.

2.21 Park Transportation Needs

As shown on Figure 2-3, parking is provided for 25 cars on the site of the waterfront park.

2.22 Park Traffic Impacts

The impact of park traffic has been included in the transportation analysis found in Section 5.3.

2.23 Park Parking

See response to Comment No. 2.21.

2.24 Feasibility of Proposed Activities

The design of the park has been a part of a lengthy public process involving the community as well as a multi-group Advisory Board. This process is explained further in Section 3.2.

2.25 Use of Pier 3 Deep Water

See response to Comment No. 1.03.

2.26 Relationship of Park to Water

The park is provided for the passive enjoyment of the water.

2.27 Need for Proposed Park

Section 4.1.2 outlines the context for the proposed waterfront park, including open space facility and acreage comparisons of the East Boston neighborhood with other neighborhoods in Boston.

2.28 Alternatives to Proposed Park

Through the public process described in Section 3.2, this park design has evolved.

2.29 Dredge Volume and Location

Approximately 12,000 cubic yards of dredge material will be dredged on either side of the proposed Pier 5; this will result in adequate water depths along each side of the proposed new Pier 5.

2.30 Quality of Dredge Materials

The quality of the dredge material has been tested, as described in Section 5.1.

2.31 Need for Dredging

Water depths of 15 feet at mean low water are required for the lobstering vessels; this is not currently provided at the site. This depth will be adequate not only for lobster boats, but for other vessels potentially needed at the site, such as fire boats and repair barges. This depth also takes into account future sediment deposition.

2.32 Dredge Disposal and Transport

It is proposed to utilize the dredge spoils as a portion of the fill material required to repair the bulkheads along the edge of the water.

2.33 Dredge Mitigation

Slope protection will be used to prevent contamination of existing soils from proposed fill dredge material.

2.34 Analysis of Benthic Community/Aquatic Life

A benthic assessment has been performed for this area; Section 5.1.4 describes the results of this analysis.

2.35 Bulkhead Repair

Reinforced steel sheet piling walls will secure the bulkheads.

2.36 Duration of Construction

The construction period will extend for 18–24 months, with the demolition of the piers expected during the first four months.

2.37 Debris Disposal Site

An off–site landfill will be used to dispose of site debris. The specific location will be identified as a part of the design contract for this project.

2.38 Construction Impacts on Surroundings

Time of truck traffic during the construction period on local streets will be reviewed with the local community. Pile driving will be conducted in accordance with City of Boston noise requirements.

2.39 Proposed Water–Based Construction Activities

Pile driving will be accomplished from barges.

2.40 Pier Replacement and Design Status

Pre–cast and cast–in–place reinforced concrete will be used. There will also be granite stone facing encompassing the core of Pier 4. The project is currently at the concept design stage. A separate design contractor will prepare final design prior to construction bidding.

2.41 Effect of Construction on Harbor Traffic

There will be minimal disruption, as the main harbor channel is wider at the location of the East Boston Piers.

2.42 Potential for Development Restrictions on Remainder of Site

The construction of Phase I does not preclude any future use of the area for other commercial and industrial activities on the Phase II site.

2.43 Impact on Deep Water Berthing

See response to Comment No. 1.03.

2.44 Water-Dependent Uses

A large percent of the site is associated with the lobstering facility, a water-dependent use. The remainder of the site is a water-related public open space; as such, the entire project is a public benefit consistent with state regulations and policies as well as waterfront planning efforts.

2.45 Site Alternatives

At this time, no other uses for these parcels are proposed.

2.46 Highest and Best Use

The legislation has determined that the highest and best use for a portion of the East Boston Piers site is that of a waterfront park to serve the East Boston community. It has also determined that the provision of an appropriate site for the lobstering operation within Boston Harbor is a priority of the greatest public interest. A study has been undertaken to determine whether more appropriate locations exist within Boston Harbor for this use; it has been discovered that there is no available land more appropriate than this site on the East Boston Piers.

2.47 Site Use Determination Process

After an extensive evaluation by a professional consultant team of possible sites in Boston Harbor for a new lobster terminal, East Boston's Pier 5 was considered as an appropriate location because of its parcel size, water depth, sufficient backland area, compatibility with surrounding area, ownership by Massport, and requiring minimal dredging.

East Boston's Pier 4 was selected for the waterfront park because of its close proximity to the East Jefferies Point neighborhood, and its ability to serve the open space needs of the East Boston population.

The adjacency of the two piers (4 and 5) is a particular advantage to the park for spectator viewing of the lobster terminal facility.

SECTION 8.0
MITIGATION MEASURES

8.0 MITIGATION MEASURES

8.1 Tidelands

The standards required to be met under the provisions of Chapter 91 have been established to ensure that projects in tideland or former tideland areas do not impair the public's rights in those areas. By compliance with those provisions, potential adverse impacts to tidelands are mitigated. The proposed combination of a water-dependent use with a water-dependent public park provides uses of the waterfront that are respectful of the provisions of Chapter 91.

The lobster terminal, comprising 2.9 acres of the project site and 7.8 acres of watersheet, is a water-dependent use. The lobstermen need a pier to tie up their boats and land area for the storage of their gear and lobsters. The survival of this industry is dependent upon the use of and proximity to Boston Harbor's waterfront. Its survival is also dependent upon the provision of a long-term designated safe berthing area on the Boston Harbor, as mandated by Legislation.

The waterfront park, comprising 6.4 acres of the project site, is also water-dependent. The character of the park is designed to relate to the waterfront and is a water enhanced use providing needed public access for residents of East Boston to their side of the harbor.

The inclusion of the core of Pier 4 as a park element provides an additional opportunity to utilize the Boston Harbor waterfront. The boardwalk along the perimeter of the site extends along the pier and along a portion of the lobster terminal parcel to facilitate observation of the lobstering operations and the harbor area. In addition, water-dependent and water-related elements have been incorporated into the park design. Water-related exhibits are planned along the pier area for public education and enjoyment, and the wave fence planned to extend from Pier 4 for protection of the lobstering fleet will be utilized as a fishing pier.

Other water-dependent activities were considered throughout the design of this park. In particular, a community boating program was reviewed in detail. Based upon discussions with community boating personnel, it was determined that this site would only be appropriate for a small number of advanced adult boaters due to safety constraints. This type of program could be accommodated between Piers 3 and 4; no recreational boating should occur between Piers 4 and 5 in order to minimize navigational conficts with the lobstermen. The cost for this type of program is significant; subsidization is required in order for it to be affordable to the public. For this reason, and because it currently appears that this type of service will be provided in a nearby location, it was agreed that this type of program should be pursued later, as a consideration for part of the Phase II development.

In general, it was determined that proposing uses between Piers 3 and 4 at this time is not appropriate. Care was taken throughout the design of this project, however, to ensure that the elements proposed are compatible with MDC operating capabilities and that the project as proposed does not constrain any future addition of water-related uses. In fact, this project creates a structurally sound pier edge providing the opportunity for future additional water-related amenities.

Since public access to the waterfront is one of the important interests protected by Chapter 91, a park enhancing passive public enjoyment and use of the waterfront is an appropriate use for this area.

8.2 Dredging/Filling

The proposed minor filling to improve conditions of the shoreline will not adversely affect the environment; therefore, no mitigation is proposed.

Dredging will be performed in such a manner as to minimize sediment disturbance. No dredging will be performed during the winter flounder season. Disposal of the dredge material is proposed to occur on the project site, as a portion of the required fill material. This will ensure that the disposal of contaminated sediments will not result in the degradation in quality of any additional site. The disposal will be accomplished under the direction of DEQE, with appropriate safeguards to eliminate the possibility of exposure to site users.

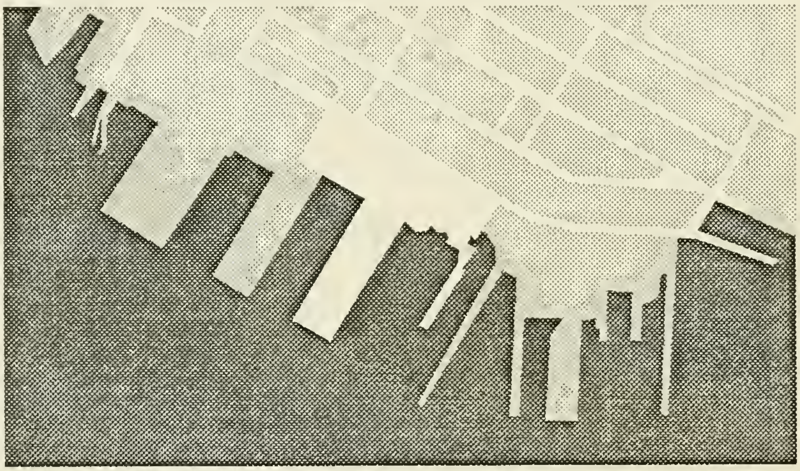
8.3 Deep Berthing/Navigation

The proposed use of the site will not require mitigation in these areas.

8.4 Traffic

Due to the size and nature of the proposed project, the traffic impacts associated with it will be minimal. Only one intersection, that of Maverick Street at Maverick Square, will be operating at an unacceptable level of service. Other projects in the MEPA process, Clippership Wharf and Boston Marine Works, have identified this location for signalization. Such mitigation would greatly improve the operation of this intersection.

APPENDICES



APPENDICES

APPENDIX A – SECRETARIAL DECISIONS
APPENDIX B – LEGISLATION
APPENDIX C – TECHNICAL STUDIES
APPENDIX D – CHAPTER 91 RESEARCH
APPENDIX E – SEDIMENT QUALITY DATA
APPENDIX F – BENTHIC ASSESSMENT DATA
APPENDIX G – TRAFFIC DATA

APPENDIX A

SECRETARIAL DECISIONS

APPENDIX A
SECRETARIAL DECISIONS

This section contains letters which document decisions made by the Secretary of Environmental Affairs regarding this project. Based upon review of an Environmental Notification Form (ENF) generally describing the proposed Lobster Terminal and Park, the Secretary determined that further analysis would be required through the preparation of this Draft Environmental Impact Report (EIR).

The Certificate of the Secretary of Environmental Affairs on the Environmental Notification Form outlines several topics within MEPA jurisdiction requiring discussion. These are:

- Tidelands
- Dredging
- Deep Berthing and Navigation
- Traffic

Due to the location and complicated project elements, MEPA further suggested that this project would receive a more appropriate level of review through a "major and complicated" designation.

On August 12, 1986, correspondence from the proponent to MEPA clarified the extent of the on-going public review process. Based upon this letter, MEPA determined that designation as a major and complicated project was unnecessary.

Resolution of a general project program occurred in February of 1988; at that time, clarification of the previously scoped items was undertaken. In a letter dated May 13, 1988, MEPA confirmed that the proponent's intended outline did substantially address the concerns outlined in the Secretary's Certificate; that letter clarified MEPA's expectations for the Draft EIR.

Accordingly, this Draft EIR has been prepared for the Lobster Terminal and Park in order to determine the extent of environmental impact due to the proposed project and to outline mitigation measures for those impacts that are unavoidable.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

MEMORANDUM

TO: Lynn Gresock, HMM
FROM: Nancy Baker, MEPA
DATE: May 3, 1988
SUBJECT: EOEA #5671, Lobster Terminal and Park

Generally, the scope of work submitted for this project, on April 15, 1988 appears to be complete. There are several points, however, that did not come across upon perusal of your outline that nonetheless deserve careful attention in this report.

Because of the outstanding "back land issue", referred to as Phase II in the Segmentation Section, and the changes in C.91 policy since the initial scoping, I am forwarding a copy of this memo to MCZM and DEQE, Waterways in the event that they may want to provide additional guidance for the EIR.

Following your format:

FUNDAMENTAL ISSUES

A discussion of the site change, from Pier 3 to Pier 4 should be included. The rationale for the change, and the maritime preemption issue should also be addressed, in response to the third item identified under Fundamental Issues (pg.2) of the scope.

The lack of physical restrictions does not necessarily eliminate restrictions on future use of the park site for maritime use. The EIR should pursue this issue from the perspective that once parkland is designated, de-designation is very difficult. Are there are means to condition the park use in a way that would not preclude future maritime industrial use, should that be desirable in the future?

SEGMENTATION

The "backland space" you refer to has not been defined spatially. I am at a disadvantage, since the site has been changed, but apparently this issue of a Phase II project will be a segmentation problem.

Furthermore, MEPA has taken a rather consistent position on segmentation of phased development of backland to waterfront parcels. You may want to review the scopes for Palmer's Cove, New Bedford, (EOEA #6722) and One Winnisimet, Chelsea (EOEA #6918), and then amend your proposal accordingly.

DREDGING/FILLING

The dredge/filling site plans should include at least existing and proposed depths, sampling sites, and sideslope elevations.

The chances are probably very good that bioassay and bioaccumulation testing will be needed at this site. Therefore, I would recommend that you proceed with that testing as early as possible. Delaying the testing and submission of the results until the Final EIR could cause additional delay, and if the material is very contaminated, the proponent may be unable to dredge indefinitely, until an acceptable disposal site is identified. Therefore, the problem, if there is one, should be identified as early as possible in the review, to improve the chances that this element of the project can proceed timely.

TRAFFIC

The traffic analysis should be able to make assumptions about the potential trip generation from the " backland". Where specific plans have not be identified at this point, a range of reasonable alternatives should be analyzed.

The issue of parking, including a demand assessment, on site availability, and discussion and mitigation for any potential parking shortfall must be addressed in this EIR. Your proposal appears to omit the parking issue.

Is there still a potential for a restaurant and parking garage on site? What is the current status of these ancillary activities, as they relate to traffic and parking?

Attachment

cc. MCZM
DEQE, Waterways

NB/nb

hm
m HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

MEMORANDUM

TO: Nancy Baker, Project Reviewer

FROM: Lynn Gresock, EIR Coordinator

DATE: April 15, 1988

SUBJECT: Massport Lobster Terminal and Park Scope Clarification

The attached table of contents and description of scope of work presents the proposed format and contents of the Massport Lobster Terminal and Park EIR. Over the past year, HMM and its subconsultants have worked closely with Massport, the East Boston community, the Boston Harbor lobstering associations and an Advisory Board whose members include representatives from state agencies to provide a lobster terminal and waterfront park that meets the requirements of the legislation and satisfies the needs of the community/lobstermen while complying with regulatory standards. We believe that the project is an appropriate use for the East Boston Piers and that it has been sensitively designed.

Please review the enclosed information. We believe that it describes a proposed Draft EIR for this project that complies with the MEPA requirements and Scoping Certificate. Since the legislative requirements include completion of the environmental process prior to review of the legislative feasibility study, we want to avoid unnecessary delays caused by a misunderstanding of expectations. Please contact me if you do not agree with the proposed scope of work.

/slb

Attachment

1752-138/ENV/628

336 Baker Avenue • Concord • Massachusetts 01742 • (617) 371-1692

TABLE OF CONTENTS

		Location in Proposed Scope of Work
1.0	SECRETARIAL DECISIONS	-
2.0	PROJECT SUMMARY	
2.1	Name of Project	-
2.2	State Identification Numbers	-
2.3	General Project Description	-
2.4	Federal and State Permits Required	-
2.5	Summary of Major Environmental Effects	-
2.6	Summary of Mitigation Measures Proposed	-
3.0	FUNDAMENTAL ISSUES	
3.1	Public Review Process	1.0
3.2	Legislative Framework/Commitments	1.0
3.4	Segmentation	3.0
4.0	PROJECT DESCRIPTION	
4.1	Type of Project	2.0
4.1.1	Lobster Terminal	2.1
4.1.2	Waterfront Park	2.2
4.2	Objectives of the Project	-
4.3	Physical Characteristics of the Site and Surroundings	-
4.4	Construction Details	-
5.0	ANALYSIS OF EFFECTS	
5.1	Tidelands	4.0
5.1.1	Historic Designations and Licensing	4.0
5.1.2	Future Licensing Needs	4.0
5.1.3	Water-Dependency of the Proposed Project	4.0
5.1.4	Chapter 91 Consistency	4.0

TABLE OF CONTENTS (Continued)

Location in
Proposed
Scope of Work

5.2 Dredging/Filling 5.0
  5.2.1 Proposed Dredging/Filling 5.0
  5.2.2 Dredge Sediment Quality and Disposal 5.0
  5.2.3 Benthic Analysis of Fill Area 5.0
  5.2.4 Mitigation Measures 5.0
5.3 Deep Berthing/Navigation 6.0
  5.3.1 Proposed Alterations in Deep Berthing Area 6.1
  5.3.2 Trends in Deep Berthing 6.1
  5.3.3 Flexibility of Proposed Alterations 6.1
  5.3.4 Navigation 6.2
    - Water Traffic 6.2
    - Potential Use Conflicts 6.2

5.4 Traffic

  5.4.1 Existing Conditions 7.0
  5.4.2 Future No-Build Conditions 7.0

  5.4.3 Expected Trip Generation

    - Automobile/Truck 7.0

  5.4.4 Future Build Conditions

    - Access/Egress Site Patterns 7.0
  5.4.5 Parking and Circulation 7.0
  5.4.6 Phase II Implications 7.0

6.0 MITIGATION MEASURES

MASSPORT LOBSTER TERMINAL AND PARK
DRAFT EIR
PROPOSED SCOPE OF WORK

1.0 FUNDAMENTAL ISSUES

The Draft EIR will describe the legislative framework for the proposed lobster terminal and waterfront park. The extent of community and agency input will be documented so readers of the Draft EIR will understand the history of the project and the complicated design requirements and concerns that have shaped the current proposal.

As you know, a Legislative Report is being prepared to discuss, among other things, the feasibility of developing the proposed lobster terminal in terms of function, operational cost and commitment to use. The Legislature must be assured, through the Legislative Report, that providing a lobster facility and park meets a public purpose in order to justify the expenditure of the allocated $20 million. In the Draft EIR, HMM will summarize the information gathered to support the commitment to this project by users.

Discussion of the constraints imposed upon development of heavy maritime use due to the proposed project will be substantially contained in the section on Deep Berthing and Navigation. However, a summary of this discussion will be included in this introductory section. In general, the lack of significant physical structures associated with the proposed project eliminates restrictions on the future use of this site for other purposes. However, Massport's commitment to the East Boston community and the lobster industry make such a change unlikely.

2.0 PROJECT DESCRIPTION/ALTERNATIVES

Through the community, lobstering association and agency review process, HMM has developed design solutions for both lobster facility and park and has continually refined the proposed scenarios to more fully meet user needs. The description of the project and discussion of alternatives in the Draft EIR will utilize the information derived from this combination of technical expertise and public process.

2.1 Lobster Pier

HMM will include the following in the Draft EIR:

- A description of the components comprising a state-of-the-art lobster facility.
- A detailed description of the proposed facility.
- An evaluation of the extent to which the proposed project meets the ideal characteristics.
- A discussion of prior alternatives considered.
- Presentation of the rationale behind the choice of the preferred alternative.
- A discussion of various compromises necessary and how the proposed project compensates for those limitations.

2.2 Waterfront Park

HMM will provide the following information in the Draft EIR:

- The current open space acreage per capita for both the Boston and East Boston Communities. Different types of open space will be defined by acreage to determine the total area of park land currently available in these communities.
- The percentage of waterfront open space in both Boston and East Boston. Again, waterfront park areas will be differentiated from other open land uses.
- A discussion of future open space needs in East Boston.
- A description of the characteristics of the proposed waterfront park, including responses to the questions raised in the comment letter from CZM of September 12, 1985 (attached).

- The post-development open space acreage for Boston and East Boston, utilizing the previously identified categories to identify the actual increase in percentage of park land area.

3.0 SEGMENTATION

The project as now proposed is located on Piers 4 and 5, instead of at the previously proposed location on Piers 3 and 5. Since the two elements of the project are now adjacent to one another, and since they are financially bound together by Legislation, environmental review of the two elements as one project is appropriate.

Development on the remaining pier and backland space will be guided by a Request for Proposals. This RFP will be prepared over the next year and will reflect consideration of the engineering, environmental and financial constraints associated with the site, as well as community and agency concerns. Since the unknown Phase II development has not yet been filed with MEPA, it is not appropriate to analyze its assumed impact for this project. When the Phase II project, however, comes before MEPA for review, this project and others that have initiated MEPA review must be reflected in ambient environmental conditions.

The potential for preclusion of future maritime development on the site will be addressed in both Section 1.0, Fundamental Issues, and in Section 6.0, Deep Berthing/Navigation. This would not appear to be a segmentation issue now that open land for future development will not separate the Lobster Terminal and Waterfront Park.

4.0 TIDELANDS - CHAPTER 91 ISSUES

The legislation specifically states that development on the East Boston Piers is subject to Chapter 91 jurisdiction. Therefore, HMM will provide the following information to meet the scope for the Draft EIR:

- Delineation of Commonwealth and private tidelands within the site.
- The history of licensing at Piers 4 and 5.
- Future license requirements at Piers 4 and 5 associated with the proposed project.

- Categorization of the proposed uses into water-dependent and non-water-dependent uses.

- Categorization of any known historic or existing use into water-dependent or non-water-dependent classification.

- Comparison of those past or existing uses with those proposed.

- Assessment of the effect of the proposed work on the water dependency of the project area.

- Consideration of alternatives that could be utilized to increase water-dependent uses on the site.

- Explanation of the ways in which the proposed project serves a proper public purpose, provides a greater public benefit than detriment to the public's rights in tidelands, and is consistent with CZM policies.

Concerns outlined by the Division of Waterways and CZM will be addressed by this information; no specific response to their comments will be included in the Draft EIR.

5.0 DREDGING/FILLING

It is likely that both dredging and filling will be proposed in conjunction with the Lobster Terminal and Waterfront Park. Consequently, HMM will provide the following in the Draft EIR:

- Reproduction of a schematic site plan indicating the location of any areas requiring dredging or filling.

- Volume calculations defining the quantity of material to be dredged and the area to be filled.

- Bulk sediment analysis in the dredge material area.

- Benthic analysis in the proposed area of fill.

- o Discussion of the need for additional sediment testing in the dredge area. If any is considered necessary, it will be performed and described in the Final EIR.

- o Identification of the disposal site for the dredged material will also be included in the Final EIR.

- o Discussion of mitigation measures proposed to protect water quality and marine resources.

6.0 DEEP BERTHING/NAVIGATION

6.1 Deep Berthing

6.1.1 Proposed Alteration of Deep Berthing Area

- o Description of changes to areas appropriate for deep berthing due to the proposed project.

- o Discussion of the implications of the proposed demolition/use of Piers 4 and 5.

6.1.2 Trends in Deep Berthing

- o Inventory of deep water pier space in Boston Harbor, citing location, linear feet, ownership and current use.

- o Comparison of present conditions for deep berthing to 1960 conditions.

- o Discussion of future deep berthing space requirements in Boston Harbor.

6.1.3 Flexibility of Proposed Alterations

- o Discussion of the possibilities for expansion of users, change of users, multiple users, etc.

6.2 Navigation

6.2.1 Types of Navigational Uses Proposed

- Description of the water access uses proposed in this project. Characteristics regarding size of craft, time of operation and traffic patterns will also be discussed.

6.2.2 Potential Use Conflicts/Impacts on Navigation

- Potential conflicts between navigational uses associated with this project will be assessed.
- The implication of surrounding waterfront uses and Boston Harbor navigational uses will be discussed, and potential conflicts will be identified.
- Mitigation measures will be described to reduce any navigational conflicts resulting from the proposed project.

7.0 TRAFFIC

HMM Associates has recently completed analysis of traffic conditions for the Boston Marine Works project, located adjacent to this lobster terminal/waterfront park property. HMM intends to utilize information gathered during that analysis to assess existing and future conditions for the Lobster Terminal and Park. Study area intersections analyzed are:

- Chelsea Street/Porter Street
- Porter Street/Orleans Street
- Sumner Street/Maverick Square
- Bremen Street/Porter Square
- Maverick Street/Maverick Square
- Maverick Street/Orleans Street
- Maverick Street/Cottage Street
- Sumner Street/Bremen Street
- Sumner Street/Orleans Street
- Sumner Street/Cottage Street

Based upon the analyses of existing and future no-build conditions, HMM will evaluate the peak period impacts on level of service at the above intersections due to traffic generated by the proposed project.

In addition, the following issues will be analyzed in the Draft EIR:

- Internal parking and circulation
- Access/egress patterns from the site
- Truck traffic volume, type, hours of activity and travel patterns
- Effects of truck traffic on the East Boston community

The portion of the East Boston piers not included in this development proposal presents an unknown factor in determining future transportation characteristics. For the purposes of discussion, a section of the traffic analysis will discuss the assumptions utilized regarding future pier development during meetings with the community and agencies. These assumptions will not be included in this Draft EIR analysis.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

CHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ON

ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME : Lobster Terminal & Park

PROJECT LOCATION : Boston

EOEA NUMBER : 5671

PROJECT PROPONENT : Massport

DATE NOTICED IN MONITOR: August 9, 1985

Pursuant to M.G.L., Chapter 30, Section 62A and Sections 10.04(1) and 10.04(9) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby determine that the above referenced project does require the preparation of an Environmental Impact Report.

See Attached Scope

eptember 23, 1985
DATE

JAMES S. HOYTE, SECRETARY

SH/NB/bk

Fundamental issues identified during the preliminary review must be dealt with through the EIR process. The report should provide a clear and thorough understanding whether or not:

- the Boston lobstermen's commitment to an East Boston Pier and facility will be strong enough to sustain operations there;
- the practical realities of developing the East Boston Piers tends to preclude commercial and industrial maritime uses;
- the potential for future maritime commerce at Piers 1 and 4 will be severely limited by the proposed development at Piers 3 and 5;
- Massport's Policy statement on Development of Waterfront Properties, August 1982 can be acted upon, given the MPA/BRA/PAC contracts and agreements covering the pier properties. In particular, how will the following statement be applicable: "Nothing in the development can preclude Massport's restoration of the site for public marine terminal pruposes, if twenty five years out, Massport determines that demand for terminal space necessitates such restoration."

The issues are of a magnitude that a project designation of major and complicated has been suggested. I am of the opinion that this approach could satisfactorily deal with the problematic segmentation issues. However, to warrant a major and complicated designation, it is necessary to have a constituency for a Citizen's Advisory Committee. Massport should explore this concept more fully and should advise me of their findings.

SCOPE

The EIR will generally follow the outline in 301 CMR 10.05(7) and should include a copy of this scope.

Project Description/Alternatives

Lobster Pier/Terminal

At the scoping session, it was learned that spatial constraints and restrictions on fishing-related activities would not be the most favorable conditions for the lobstermen. This issue should be explored further by comparing the optimal facility requirements with the proposed development. Project alternatives and compensation for these limitations should be evaluated.

Waterfront Park

The second element of this project is a regional, six acre park. The regional park concept should be defined in terms of this proposal. Active and passive recreational opportunities, unique features and amenities should be discussed.

East Boston formerly lagged behind the City of Boston in terms of open space acreage per capita. Is this still true? Compare existing and post-development open space per capita ratios with the City of Boston. What percent of open space is waterfront in East Boston, and in the City of Boston? Explain the future open space needs in East Boston.

Coastal Zone Management has raised a number of questions regarding the park proposal which deserve consideration. Their request for alternate park designs and park uses should be fully explored.

Segmentation

The EIR should evaluate the segmentation issues. Explain why an environmental review of Pier 3 and Pier 5, which consist of unrelated, physically separate elements, is appropriate. Maritime development which is precluded because of this development was briefly discussed in the Environmental Audit. The EIR must provide a thorough analysis of the range of maritime developments that will be prohibited because of the proposed park and lobster terminal.

Tidelands - Ch. 91 issues

The EIR will specifically address the tidelands issues raised in the Division of Waterway's and Coastal Zone Management's remarks.

1. Generally the EIR should delineate Commonwealth and private tidelands. Past and future licensing requirements at East Boston Piers 1 through 5 should be discussed.

2. Categorize the water dependent and non-water dependent activites proposed. Identify and categorize historic and existing water and non-water dependent activities. Compare the existing and past activities with the proposed. Include an assessment of the effect of removing Pier 3 and any other change that could be perceived as a step toward increasing non-water dependent uses.

3. Consider any project alternatives that would change the balance of water and non-water dependent uses of the project proposal.

4. Based on the previous analyses, explain how the proposal:

    i. serves a proper public purpose,
    ii. provides a greater public benefit than detriment to the public's rights in tidelands,
    iii. and is consistent with policies of Coastal Zone Management

Dredging

Additional information regarding the dredging aspect of this project is required. Include a description of the area to be dredged, the volume of dredged material and a bulk sediment analysis. Based on the characterization of the contaminant levels in the material, additional elutriate, bioassay and bioaccumulation testing may be necessary. A disposal site for the dredged material must be identified. Mitigation measures for dredging impacts on water quality and marine resources should be mentioned.

Deep Berthing/Navigation

The Boston Shipping Association maintains that the project sites is the last remaining deep water peir with rail access in Boston Harbor. The potential elimination of deep water maritime uses should be assessed in the EIR, since deep water pier space is a finite resource in the Harbor. The EIR must evaluate the importance of available deep water berthing space in Boston Harbor and secondly, assess the implications of demolishing Pier 3, limitations on future use of Pier 4 and the use of Pier 5 by lobstermen.

Inventory the deep water pier space in the harbor by location, linear feet and user. What flexibility exists for expansion of users, change of users, multiple use, etc.?

Historical trends in deep berthing needs and use in Boston Harbor should be documented. Has there been a net loss or gain in the available berthing space since 1960? Conflicts of use should be noted.

Discuss the project's potential effects on navigation pursuant to Ch. 91 requirements. Any interference with or impacts on navigation should be identified and mitigation recommended.

Traffic

The temporal distribution of traffic on Margin Street, Orleans Street, Cottage Street, Sumner Street, Maverick Street and Bremen Street should be analyzed. A traffic engineering study should also consider access/egress patterns from the site, and internal parking and circulation. Increase truck impacts and routing through the neighborhoods should be evaluated.

Expansion plans on the lobster terminal site allow for a restaurant and parking garage. Potential traffic impacts from these future plans should be analyzed. Traffic generation, peak period traffic impacts on levels of service at key intersections should be analyzed. The assumptions concerning project scale should be explained. Based on impacts identified, the EIR should discuss whether traffic impacts would be limiting factor to future expansion.

JSH/NB/bk

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Wetlands and Waterways Regulation
One Winter Street, Boston 02108

S RUSSELL SYLVA
Commissioner

RECEIVED
SEP 16 1985
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

MEMORANDUM

TO: Nancy Baker, Associate Environmentalist, MEPA Unit.

FROM: Charles J. Natale, Acting Chief Engineer, DWWR

SUBJECT: Comments on the porposed Lobster Terminal and Park at
East Boston Piers 3 and 5;
E.O.E.A. #5671

DATE: September 12, 1985

The Department has reviewed the above-subject E.N.F. and supporting documents and requests that an Environmental Impact Report be required pursuant to 301 CMR 10.04-05. In accordance with this request, we offer the following comments pursuant to G.L. Chapter 91 and its regulations; 310 CMR 09.

1. The Department's preliminary review of this project porposal has determined that East Boston Piers 1-5 are in and over filled former Commonwealth tidelands and is therefore subject to regulatory review pursuant to G.L. Chapter 91 and 310 CMR 09. Since both water-dependent (Lobster Terminal) and nonwater dependent (Waterfront Park) uses are proposed, Section 14 and Section 18 of G. L. c.91 provides that the Department must determine before a Ch. 91 license can be issued that the project proposal: 1) serves a proper public purpose, 2) provides a greater public benefit than detriment to the public's rights in tidelands and 3) is consistent with the policies of the Office of Coastal Zone Management. Since it is the responsibility of the proponent to provide a detailed analysis of how this project proposal satisfies these statutory requirements, it would therefore seem appropriate in this case for the proponent to provide this analysis through an Environmental Impact Report and the M.E.P.A. review process.

2. The proponent should provide detailed information on the areal extent of fill on former tidelands at the site. This would include; descriptions of the site's c. 91 licensing history for all structures and fill authorized, the most landward position of record of the historic high water shoreline and the related primitive extreme low water line, and figures depicting the areal extent of historic fill placed on formerly existing tidelands. The proponent should also provide an analysis of the types of tidelands involved in the project (i.e. private and commonwealth tidelands) since this directly relates to the magnitude of the public's interest in this proposal.

Proposed Lobster Terminal

1. The proponent should provide a detailed analysis of the potential short-term and long-term impacts of eliminating various types of commercial maritime industrial shipping capabilities of this deep water access site. Deep water shipping access to landside facilities for commercial industrial maritime uses within Boston Harbor is a finite commodity and an issue has been raised concerning the impacts of eliminating any potential commercial industrial maritime shipping capabilities at this site, especially given the fact that this appears to be one of the only sites along the East Boston Waterfront which has a direct rail access link.

2. At the MEPA consultation meeting held on September 4, 1985 at Massport, it was brought out that the lobster fishermen ideally need 6 acres of landside area to provide the facilities necessary for optimal operational capabilities associated with this fishery. The proposed Lobster Terminal at East Boston will provide 3.5 acres. The proponent should provide an analysis of the types of operational constraints, if any, that would result from a facility located on the proposed 3.5 acre site versus a 6 acre site. Would a smaller site area result in split operations between the existing South Boston site and the proposed site?

3. The proponent should provide a description of the anticipated types and level of uses at the Lobster Terminal during the lobstering season and off-season which would ensure optimal use of this facility, particularly during the off-season.

Proposed Waterfront Park

1. The proponent should provide a detailed description of the location, type and quality of public access to and within the proposed waterfront park, including on and off-site parking and/or vehicular access.

2. The proponent should provide a detailed description of the types of passive and/or active recreational facilities to be provided in the proposed park, including amenities which would link land and water-based recreation at the site (i.e. fishing pier, viewing platform, etc.)

As a final comment, it is evident that the proposed Lobster Terminal and Waterfront Park are only a segment of the entire Piers 1-5 redevelopment plan and that the planning process for Pier 1 is pending completion. It is important that the proposed uses on Piers 3 and 5 i.e., Waterfront Park and Lobster Termina not be incompatable with anticipated uses of the remaining redevelopment site. The DEIR should contain a discussion of use compatability to ensure an orderly approach to redevelopment of the entire site.

In conclusion, the Department reiterates that an E.I.R. should be required for this project proposal since it would provide the information necessary for public scrutiny relating to Chapter 91 issues. We thank you for the opportunity to comment and would appreciate your notification of any future meetings or discussions on this proposal. Should you have any questions or comments, please feel free to contact me at [illegible].

[illegible]

cc: Meriel Hardin, Acting Director, DWWR
Carl Dierker, DEQE Legal Counsel
Gary Clayton, Deputy Director, Coastal Zone Management

CN/ie

COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MEMORANDUM

TO: SAM MYGATT, DIRECTOR, MEPA UNIT

FROM: RICHARD F. DELANEY, DIRECTOR

DATE: SEPTEMBER 12, 1985

RE: EOEA #5671 LOBSTER TERMINAL AND PARK

The Massachusetts Coastal Zone Management (MCZM) Office has reviewed the Environmental Notification Form (ENF) for the above referenced project which was published in the Environmental Monitor dated August 9, 1985. Based on the information provided, we recommend the preparation of an Environmental Impact Report (EIR). MCZM finds the area under consideration to be of significant size and scope to impact the water resources of the area. Therefore, we wish to review some of the more relevant issues that were not addressed adequately in the ENF. The following questions will help us determine the benefits and impacts of the proposed project on the coastal zone.

1. What exactly is the amount of land area which will be impacted by the proposed development project?
    a. What portion of the land area will be used for lobster related activities?
    b. Where will new structures be placed, what portion of the site will they occupy and for what purpose?
    c. What portion of the lobster site will be assigned to parking, and where will it be located in relation to the waters edge?
    d. What portion of the active lobstering area will be used for the storage, removal and packaging of the product?

2. Given that pier four is in the middle of piers three and five, what is it's present use and what are the future plans for its development?

3. What options for activities exist on pier 4 given the proposed use of the abutting piers?

4. The ENF states that 13 acres comprise the project area, however, information is only provided with regard to six acres. What is the status of the remaining seven acres?

5. Transportation issues seem to be a significant factor in the use and design of the terminal and the other piers in the area. What is the basis for the vehicle trip information provided in the ENF?

    a. Is there information (estimates) on the number of trucks, size of loads, and hours of peak travel?

    b. Have estimates been made to determine the impacts of expanded activities on the lobster pier during the summer or if the site becomes a major wholesale location?

    c. Has a transportation analysis been done to determine the impacts of the traffic, given possible future development on the lobster site (i.e. a restuarant) or on other sites within the general area (i.e. the park, possible housing or recreational activities).

    d. What are the project demands for parking and traffic over the next ten years?

6. Park site, activities and design.

    a. What type of park is being proposed; active, passive or mixed use facility? Six acres is quite large and in some respects restricts a large portion of the coastal zone.

    b. What other type of activities will be allowed on the site; vendors, concert programs, bikes, skateboards, etc.?

    c. What type of activities will take place near the waters edge?

d. Will there be any fixed structures on the park site? What size, for what purpose, and how will they be maintained?

e. How will the park be maintained and which agency will be responsible for safety, health, and management of the site?

f. Will there be a management plan for the park?

g. What will be the hours of use and who will monitor activities to determine proper use?

h. Is there a plan to tie-in the other activities within the total site to the park?

i. What will be the transportation needs of the park? Where will vehicles and equipment be stored?

j. What is the projected use of the park and what impact will it have on transportation flow and parking within the residential community?

k. Will parking be provided within the park space? If so, how many cars and where?

l. Has there been any analyses of the area to determine the feasibility or activities within the area?

m. Are there plans to make adequate use of the deep water facilities at pier 3? What will be the relationship of the park to the water?

n. What studies have been done to determine the demand for a park within the area? How many parks exists within ¼ mile of the proposed site?

o. Are there alternative designs or uses for the park space?

7. Please define to what extent construction and dredging will take place on the site.

a. How much is to be dredged and from where?

b. Has there been test borings to determine quality of dredge materials?

c. What has been done to determine the need for dredging?

d. Where will the dredged material be disposed of? How will it be transported?

e. What measures will be taken to prevent migratory contamination to surrounding areas during the dredging operation?

f. Is there a comprehensive analysis of the benthic community and other acquatic life within the proposed dredge area?

g. What will be done to secure the bulkhead? What type of materials will be used?

h. How long is the proposed construction period? Where will the debris and other material be disposed of?

i. What are the possible impacts of construction on the surrounding community? How will noise and general activity effect the nearby public school?

j. What water base construction activities are proposed besides the proposed dredging?

k. What types of materials will be used in replacing the piers? Where are the designs for the proposed replacement?

l. To what extent will the proposed construction activities effect traffic within the harbor?

8. Future uses of an area are important to the environmental soundness of proposed projects. It is therefore important to have an idea as to the proposed use of the remaining parcels within the site.

   a. Does the proposed activities for piers three and five exclude any future use of the area for other commercial and industrial activities?

   b. Has there been an evaluation of the impact of the loss of these deepwater berthing sites on the future of shipping activities within the area?

c. What portion of the proposed site can be dedicated for water dependant activities other than lobster landings?

d. Are there any other proposals for use of this area other than the park and lobster landing?

e. Has there been an area specific economic development analysis, a city wide analysis, or a regional analysis to determine the highest and best use for the area?

f. How was the proposed uses for the site chosen over other possible activities?

RFD/LAE:sla

APPENDIX B

LEGISLATION

H 2551

Chapter 349

THE COMMONWEALTH OF MASSACHUSETTS

In the Year One Thousand Nine Hundred and Eighty-six

AN ACT PROVIDING FOR THE DEVELOPMENT OF FACILITIES WITHIN BOSTON HARBOR FOR THE LOBSTER FISHING INDUSTRY AND FURTHER PROVIDING FOR THE REVITALIZATION OF THE EAST BOSTON PIERS PROPERTY.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

SECTION 1. It is hereby found that:

(1) The waterfront property known as East Boston Piers 1 through 5 is a component of the port properties owned and operated by the Massachusetts Port Authority pursuant to chapter four hundred and sixty-five of the acts of nineteen hundred and fifty-six.

(2) Title to the piers was vested in the authority in February 1959, at which time the authority assumed responsibility for the operation and maintenance of said facility.

(3) The piers are currently underutilized and require extensive repair before a more productive use can be implemented.

(4) The piers are a potentially valuable resource to the Boston harbor community, the East Boston community, and the commonwealth to facilitate commerce in East Boston, including public access to the harborfront.

(5) Absent public investment, the private sector will be unable to stimulate economic activity sufficient to provide appropriate redevelopment of the piers and abutting land consistent with community and regional needs, to fully utilize potential resources of the piers and harborfront, to prevent further deterioration of the piers, and to be able to do so in a financially self-sustaining manner.

(6) The lobster fishing industry is in need of a permanent facility in Boston harbor in order to continue operation; the East Boston harborfront, including portions of the piers, can accommodate uses for a lobster facility and water front park, which uses are determined to be in furtherance of the interests of the citizens of the commonwealth in accordance with the provisions herein and are further determined to be consistent with the ongoing examina-

tion and implementation by the authority of alternate uses for the remaining portions of the piers.

(7) Other sites within the Boston Harbor area may also be suitable for development of lobster pier facilities.

SECTION 2. The following words as used in this act shall, unless the context clearly requires otherwise, have the following meanings:-

"Authority", the Massachusetts Port Authority.

"Board", the advisor board, established by section five of this act.

"Commissioner", the commissioner of the department of the metropolitan district commission.

"Department", the department of the metropolitan district commission.

"Division", the division of capital planning and operations.

"East Boston", the East Boston section of the city of Boston.

"PAC", the East Boston Project Advisory Committee, Incorporated established in accordance with an agreement between the authority and the Boston Redevelopment Authority to provide community based advisory assistance to planning activities for revitalization of the piers.

"Piers", Piers 1 through 5 located in the East Boston section of the city of Boston which constitute a part of the port properties as defined in chapter 465 of the acts of 1956 as amended.

"Plan", the plan involving a certain segment of the piers and entitled "Land in the East Boston section of the city of Boston to be developed by the department of the metropolitan district commission and Massachusetts Port Authority for use as a lobster pier and terminal and as a waterfront park", which plan is on file at the authority and the department of environmental management and which, on the effective date of this act, shall be on file at the department of the metropolitan district commission, and which may be amended from time to time by an agreement between the authority and the department.

SECTION 3. The division, on behalf of the commonwealth and in consultation with the department, is hereby authorized and empowered:

(a) to enter into an agreement or agreements with the authority concerning the lease, planning, design, construction, use, operation and maintenance of a lobster facility and park at the piers in general accordance with the plan; and setting out the financial responsibilities of both the department, and the authority relative to these facilities and consistent with the purposes and provisions of this act, provided however that any such agreement shall require that the authority reimburse the commonwealth in the amount of any state funds expended for the planning, design and construction of a lobster facility located at the piers prior to conveying title to said piers or facility to any other party.

(*b*) to lease for a term which may not exceed twenty-five years, develop, improve, maintain, and operate the lobster pier facilities, including associated facilities, at the piers but only to the extent set forth in the agreement between the division and the authority and subject to the provisions of section seven;

(*c*) to fix and revise from time to time and to charge and collect such fees, rentals or other charges for the use of said lobster facilities, but only to the extent allowed pursuant to the agreement between the division and the authority; and provided, however, that any such fees, rentals or other charges collected hereunder shall be applied as required under section ten; and provided, further, that any lobster pier facilities constructed in accordance with the provisions of this act shall be available to prospective users of the facilities, upon payment of a reasonable fee, in a nondiscriminatory manner;

(*d*) to lease for a term which may exceed ten years, acquire upon completion of construction, develop, improve, maintain, and operate the waterfront park, at the piers, including associated buildings and facilities and improvements thereon, as a public park for the benefit and enjoyment of the general public and to the extent set forth in the agreement between the division and the authority and subject to the provisions of section seven;

(*e*) to apply for and receive funds from any source, public or private, by gift, grant, bequest, or otherwise, and to expend the same on behalf of the department to provide for the design, construction and operation of a lobster pier and associated structures, facilities, and improvements thereon, and a waterfront park, pursuant to and in accordance with the plan and agreement between the division and the authority;

(*f*) to enter into any other agreements with any person or entity or to otherwise act in order to effectuate the development of lobster facilities at any site other that the piers deemed suitable by the division and located in the Boston harbor area. The division shall have the same powers relative to such a site as those granted under clauses (*b*), (*c*) and (*e*) of this section but without the limitations that apply to agreements with the authority with respect to the piers; and

(*g*) to do any and all things necessary or convenient to carry out its purposes and exercise the powers conferred by this act; provided, however, that acquisition of any interest in real property pursuant to this act shall be made in accordance with the provisions of sections forty F to forty H, inclusive, of chapter seven of the General Laws and the purposes described in Article XCVII of the Amendments to the Constitution of the Commonwealth; and provided, further, that the deputy commissioner of the division may delegate any authority conferred upon him by this act to the commissioner of the department so long as said delegation conforms with section forty E of said chapter seven.

SECTION 4. In addition to all powers otherwise granted to the authority in act or by law, the authority is hereby authorized and empowered:

(*a*) to enter into an agreement or agreements with the division concerning the planning, design, construction, use, operation and maintenance of the lobster facility and park at the piers and setting out the financial responsibilities of both the department and the authority relative to these facilities and consistent with the purposes and provisions of this act; provided, however, that any such agreement shall require that the authority reimburse the commonwealth in the amount of any state funds expended for the planning, design and construction of a lobster facility located at the piers prior to conveying title to said piers or facility to any other party;

(*b*) to lease for a term which may not exceed twenty-five years, design, construct, improve, maintain, and operate the lobster pier facilities, including associated facilities, at the piers, for the use and benefit of persons engaging in the lobstering industry pursuant to a license, lease, use agreement or any other type of authorization that the authority may grant in its discretion;

(c) to fix and revise from time to time and to charge and collect such fees, rentals, or other charges for the use of said piers or associated facilities under the authority's control, provided that any lobster pier facilities constructed in accordance with the provisions of this act shall be available to prospective users of the facilities, upon payment of a reasonable fee, in a nondiscriminatory manner;

(*d*) to design in consultation with and subject to review by the department, construct, improve, and maintain the waterfront park, including associated buildings, facilities and improvements thereon, at the piers, as a public park for the benefit and enjoyment of the general public;

(*e*) to apply for and receive funds from any source, public or private, by gift, grant, bequest, or otherwise, and to expend the same on behalf of the authority to provide for the design, construction and operation of a lobster pier and associated structures, facilities and improvements thereon, and a waterfront park, at the piers, pursuant to and in accordance with the plan;

(*f*) to convey or lease to the division for no consideration, upon completion of construction of the waterfront park, said park at the piers, including all associated buildings and facilities and improvements thereon, which shall be used by the department as a public park for the benefit and enjoyment of the general public. Any such conveyance or lease may be made upon such terms as may be agreed upon by the authority and division subject to the applicable provisions of sections forty F to forty H, inclusive, of chapter seven of the General Laws; and

(*g*) to do any and all things necessary or convenient to carry out its purposes and exercise the powers conferred by this act.

SECTION 5. (*a*) Any planning, acquisition, design, construction, demolition, repair or maintenance undertaken pursuant to this act shall be deemed a "building project" pursuant to the provisions of chapters seven and twenty-nine of the General Laws.

(*b*) To the extent consistent with agreements authorized by sections three and four of this act, the authority may accomplish such work, or a portion thereof, as lead administering agency so called, in consultation with the division and the department, and on any work undertaken by the authority as such lead administering agency, the department may be deemed the using agency, provided that the certifications required by sections twenty-six A and twenty-six B of chapter twenty-nine of the General Laws shall be the responsibility of the deputy commissioner of the division.

(c) The authority, in cooperation with the department, shall prepare a report on the development of the lobster facility and waterfront park pursuant to this act, and shall file said report with the general court for review. At least thirty days before filing said report, however, the authority, in cooperation with the department, shall submit said report to the Inspector General of the commonwealth, and shall annex the comments, if any, of the said inspector general to said report. Said report shall include, but not be limited to (1) a study or program pursuant to the provisions of section seven K of said chapter twenty-nine; (2) a feasibility study relative to the provision of such facilities as are necessary in order for the lobster fishing industry to continue operation in Boston Harbor; (3) a comparison of the suitability, costs, and benefits of alternative sites, if any, for permanent lobster facilities in Boston Harbor; (4) an inventory of any additional facilities which will continue to be necessary for the operation of the lobster industry in Boston harbor, together with cost and market study projections indicating the capacity of the lobster industry to obtain use of such facilities with public subsidy; (5) operation and major maintenance cost projections, for the first ten years of operation of facilities funded by this act; (6) a schedule of anticipated fees, rentals or other charges for the use of lobster facilities funded by this, act for the first ten years of operation, including market study projections demonstrating the capacity of the lobster industry to pay such amounts; (7) a review of all relevant public properties in Boston harbor as they relate to their current or potential marine industrial, commercial, and deep water use; (8) evidence that the development of the lobster terminal and waterfront park, as authorized in this act, will not preclude future maritime industrial or commercial activity; (9) certification that the requirements authorized pursuant to the provisions of sections sixty-one to sixty-two H, inclusive, of chapter thirty, chapter ninety-one, and section forty of chapter one hundred and thirty-one of the General Laws and all other applicable general or special laws have been satisfied, (10) evidance that the authority has provided for the share of funding for which it is responsible under terms of the agreement authorized in clause *(a)* of section 4.

SECTION 6. The department and the authority shall continue to coordinate with tbe PAC and the Boston Redevelopment Authority for the purpose of obtaining the advisory input of the East Boston community and the city of Boston relative to design and environmental review as required under sections sixty-one to sixty-two H, inclusive, of chapter thirty of the General Laws in the event final agency approval for the lobster facilities and waterfront park is sought at the piers.

The department and the authority shall convene and appoint an advisory board which shall consist of eight members, one of whom shall be the commissioner of the department or his designee, one of whom shall be the executive director of the authority or his designee, one of whom shall be the commissioner of the department of environmental quality engineering or his designee, one of whom shall be the director of the Boston Redevelopment Authority or his designee, one of whom shall be the president of the Boston Harbor Lobstermen's Cooperative or his designee, one of whom shall be a representative of the PAC and two of whom shall be residents of Marginal Street in East Boston and be designated by the PAC. The executive director of the authority or his designee shall serve as chairperson of the board. Upon completion of construction at the piers, the commissioner or his designee and the executive director of the authority or his designee shall serve as co-chairpersons of said board.

Said board shall assist in the planning, design, and construction of the lobster facilities and the waterfront park. Upon completion of construction at the piers said board shall provide consultation to the department and the authority in operating the lobster pier and waterfront park.

The members of said board shall serve without compensation. Said board shall meet from time to time to review the operation and maintenance of said facilities and waterfront park and may advise the department and the authority with the respect to their respective duties as provided in this act. Said board shall also advise the department and the authority concerning relationships between and among users of said pier and waterfront park, residents of the East Boston community, and other development projects on the East Boston Piers.

SECTION 7. The provisions of chapter ninety-one of the General Laws shall apply in full to any development undertaken on the piers, including the projects authorized hereunder. The provisions of sections sixty-one to sixty-two H, inclusive, of chapter thirty of the General Laws shall also apply for all projects proposed at the piers, including the lobster facility and waterfront park to the extent applicable to projects of the authority. For the purposes of compliance with said sections 61 through 62H, the authority shall be deemed to be lead agency project proponent.

SECTION 8. The department is hereby authorized to expend a sum not exceeding fifteen million dollars for the purpose of development of a waterfront park at the piers pursuant to and in accordance with the plan, and lobster pier facilities either at the piers pursuant to and in accordance with the plan or at any alternate site that the department may deem suitable; provided, however, that no funds authorized by this act shall be expended, except for the necessary costs related to the environmental review, preliminary design, and report required by section five unless notice of such expenditures, together with said report is filed with the clerks of the house and senate while the general court is in session and the general court has failed to pass a resolve disapproving of such proposed action and report within the next thirty days after such filing.

SECTION 9. To meet the expenditure necessary in carrying out the provisions of this act, the state treasurer shall, upon request of the governor, issue and sell bonds of the commonwealth, registered or with the interest coupons attached, as he may deem best, to an amount to be specified by the governor from time to time, but not exceeding, in the aggregate, the sum of fifteen million dollars. All bonds issued by the commonwealth, as aforesaid, shall be designated on their face, Boston Harbor Improvements Loan, Act of 1986, and shall be on the serial payment plan for such maximum term of years, not exceeding twenty-five years, as the governor may recommend to the general court pursuant to Section 3 of Article LXII of the Amendments to the Constitution of the Commonwealth, the maturities thereof shall be as nearly equal as in the opinion of the state treasurer it is practicable to make them. Said bonds shall bear interest semiannually at such rate or rates as the state treasurer, with the approval of the governor, shall fix. The initial maturity of such bonds shall be payable not later than one year from the date of issue thereof and the entire issue not later than June thirtieth, two thousand and eleven.

SECTION 10. The state treasurer may borrow from time to time on the credit of the commonwealth such sums of money as may be necessary for the purpose of meeting payments authorized by section eight and may issue and renew from time to time notes of the commonwealth therefore, bearing interest payable at such time and at such rates as shall be fixed by the state treasurer. Such notes shall be issued and may be renewed one or more times for such terms, not exceeding one year, as the governor may recommend to the general court in accordance with Section 3 of Article LXII of the Amendments to the Constitution of the Commonwealth, but the final maturities of such notes, whether original or renewal, shall not be later than June thirtieth, nineteen hundred and ninety-six.

Notes and interest thereon issued under the authority of this section, notwithstanding any other provisions of this act, shall be general obligations of the commonwealth.

SECTION 11. Any and all revenues received by the authority from the lobster facility and waterfront park at the piers from rentals, fees, or any other charge or source other than grants made for specific purposes relating to the lobster facility and park, shall be deposited with the authority and applied as required by any applicable indenture or indentures of trust to which the authority is subject. To the extent allowable under such trust indenture or indentures the authority shall make annual payments to the commonwealth by deposit to the fund established hereunder of all such revenues, which revenues shall in turn be applied toward the operating and maintenance expenses of the lobster facility and waterfront park and for the establishment of reserve accounts for working capital, maintenance and repairs

There shall be established and set up on the books of the commonwealth a separate fund to be known as the East Boston Piers Fund and which shall consist of all revenues received by the commonwealth from the authority relative to the lobster facility and waterfront park and all other monies credited or transferred thereto from any other fund or source pursuant to the law. Said funds shall be expended by the department, subject to appropriation and the laws relating to state finances, for the operation, maintenance or other expenses relative to the lobster facility and waterfront park.

The commissioner shall file with the state treasurer and state auditor an annual report of the fund based upon the status of the fund on June thirtieth of the preceding fiscal year. The fund shall be subject to an annual audit by the state treasurer.

House of Representatives, July 11, 1986.

Passed to be enacted, George Keverian, Speaker.

In Senate, July 12, 1986.

Passed to be enacted, William M. Bulger, President.

July 23, 1986.

Approved,

Michael Dukakis Governor.

APPENDIX C

TECHNICAL STUDIES

TECHNICAL LETTER

RE: Wave Protection for East Boston Piers

Letter dated April 29, 1988 from John Gaythwaite, P.E. to Hayden/Wegman, Inc.

JOHN GAYTHWAITE, P.E.
CONSULTING ENGINEER
(617) 526-4071
MARINE CIVIL • OCEANOGRAPHICAL • STRUCTURAL
ENGINEERING

155 PINE STREET
MANCHESTER BY THE SEA
MASS. 01944

29 April 1988

Hayden/Wegman, Inc.
214 Lincoln Street
Boston, MA 02134

RE: East Boston Lobster Pier

Attention: Mr. Vahid Ownjazayeri

Gentlemen;

This letter serves to summarize our discussions at your offices on 27 April 1988 regarding proposed wave protection for the subject project. The conceptual plans of March 1988 show the lobster boat berthing area to be in a relatively well sheltered location between the former Boston Shipyard's Pier No. 1 and East Boston Pier No. 4. Based upon my knowledge of wave conditions in the area and in consideration of the commercial nature of the proposed use, I believe that wave action at the site should not be a major problem but that some degree of wave attenuation should be provided to protect against strong southwest winds and vessels wakes. The proposed wave fence should provide adequate protection provided that the vertical facing is solid and impervious and extends from approximately fifteen (15) feet below mean low water (M.L.W.)_ to preferably twenty (20) feet above M.L.W. The controlling design wave height would be about four feet which will result in relatively high theoretical forces. Therefore, the vertical piles will need to develop nominal uplift resistance and the wave fence option is contingent upon suitable subsurface conditions.

The alternative use of approximately sixteen (16) foot wide or greater solid floating docks as a floating breakwater should be considerably less expensive and offers additional transient berthing space. Such a floating breakwater properly moored to pile clusters should reduce incident wind wave and vessel wake heights on the order of fifty percent or more resulting in maximum wave heights within the protected area of generally less than eighteen inches under storm conditions.

Additional protection and perhaps additional berthing space could be provided by the use of a floating dock extension from the southeast corner of Pier No. 4 which could be hooked to provide an even more protected entrance channel clear of waves reflected from the wave fence. A suitable floating breakwater could be installed for on the order of $1,500./lineal foot.

I am enclosing herewith a copy of a paper describing the design of a concrete wave fence at Fisherman's Wharf in San Francisco Bay and a graph illustrating the relative effects of water depth, baffle draft, and wave length on wave attenuations of a wave fence which I trust will be helpful to you. If I can be of further service as your design plans develop, please do not hesitate to contact me.

Sincerely,

John Saythwaite

John Saythwaite, P.E.

JG/bn

Encl.: Paper
Graph

TECHNICAL STUDY

MASSPORT LOBSTER TERMINAL & WATERFRONT PARK FEASIBILITY ANALYSIS/LEGISLATIVE REPORT

SECTION 3.0

ANALYSIS OF ALTERNATIVE SITES

(DRAFT)

3.0 ANALYSIS OF ALTERNATIVE SITES

The needs of the lobstermen in Boston Harbor have been examined in some detail, and a program of site requirements has been established to meet those needs (Section 2.3.3). This section identifies the potential sites available for the construction of a lobster facility and assesses each site's strengths and shortcomings in terms of established requirements of the Boston lobster industry.

3.1 Identification of Alternatives

Independent of the review of the program needs for the Boston Lobster Industry and the market factors influencing the industry, a comprehensive review has been undertaken of the potential location(s) for a new Boston lobster terminal.

The methodology used to identify the alternative sites involved a review of all studies previously undertaken to locate a lobster terminal in Boston Harbor; a detailed utilization of the "Harbor Data Bank" compiled by Boston Harbor Associates for the Boston Inner Harbor Water Dependent Use Study; and detailed discussions with individuals from Massport, the City of Boston, Boston Harbor Associates, Division of Marine Fisheries, the Boston Lobstermen's Association, and the Boston Lobstermen's Coop.

3.1.1 Sites Search Utilizing the "Harbor Data Bank"

The search for alternate sites included utilization of the Harbor Data Bank. This data base, compiled by Boston Harbor Associates (BHA), provides an inventory of all property with frontage on Boston Harbor. Working with Massport and the individuals responsible for constructing the data base, a copy of the Harbor Data Bank and the software needed to access the Data Bank was acquired.

Initial Screening

The Harbor Data Bank contains information on every waterfront site in Boston Harbor; approximately 260 sites, including portions of Everett, Chelsea, Charlestown, Downtown Boston, East Boston, and South Boston can be accessed. The software program used allowed this data to be screened and rated according to a large number of designated variables. Initial site screening criterion required that appropriate sites have 1) an area larger than 3.5 acres, and 2) a water depth of greater than 8 feet. Of the 260 sites described in the database, 54 of them met these initial screening parameters.

Secondary Screening

The 54 sites identified during the initial screening were then subject to a two-part secondary screening process which divided the sites by ownership, and eliminated sites that are either actively used or that have firm development proposals. Additionally, sites along the Mystic River and Chelsea Creek were eliminated from further consideration due to insufficient land area, as well as distance from the mouth of Boston Harbor and winter icing conditions.

Of the 54 sites, 34 were privately owned, while 20 were publicly owned. Of the 34 privately-owned sites listed in the database, only four are listed as currently vacant parcels. Of the 20 publicly owned sites, 14 were in existing use (six with water dependent uses) leaving six possible sites for the facility. Therefore, the total number of possible sites was, at this point, reduced to 10.

Third Screening

The remaining 10 sites were subjected to a third and final screening, which included a field check to verify existing site conditions and uses. Of the remaining four privately owned sites, each had specific constraints which eliminated them from further consideration. These constraints included use of the location for existing water dependent uses not indicated in the database, lack of usable dry upland area and inadequate site configuration.

The remaining six publicly owned sites included the following:

1) East Boston Piers – East Boston (Massport)
2) MBTA Power Plant Site – South Boston (MBTA)
3) Old Boston East Site – East Boston (City of Boston)
4) 826 Border Street – East Boston (City of Boston)
5) Old Navy Fuel Pier – East Boston (Massport)
6) 300 Condor Street – East Boston (Boston Conservation Commission)

In the third level screening, sites 4, 5, and 6 were eliminated from further review. The reasons for rejection were insufficient dry upland area (Site 4), significant on-site environmental problems (Site 5) and incompatible uses (Site 6 is dedicated park land).

3.1.2 Sites Identified by Individuals

As noted above, in addition to utilizing the Harbor Data Bank and reviewing prior studies, the suitability of alternative sites was discussed with individuals from organizations associated with Boston Harbor. In almost all cases, the individuals contacted identified one or more of the sites listed above as their first choice for a new lobster terminal facility. Several additional sites were also suggested, including sites at Mill Street in East Boston, and two possible sites along the Mystic River. Upon examination, however, these sites did not prove to be viable due to recent development proposals (Mill Street) or insufficient land and access opportunities (Mystic River sites).

Discussion with lobstermen in the Harbor and representatives of the Boston Harbor Lobstermen's Association and Boston Harbor Lobstermen's Coop identified the only other viable alternative site scenario. This involved a "split site" utilizing both the East Boston Piers Site and the MBTA South Boston site. The lobstermen's interest in this scenario stems from their desire to maintain traditional neighborhood ties in both East and South Boston. This "split site" option is included in the evaluation of alternative sites as a separate "site."

3.2 Profiles of Alternative Sites

The final alternatives selected for analysis are listed below:

Alternative Number	Site Name	Location
1	East Boston Piers	East Boston
2	MBTA Power Plant Site	South Boston
3	Old Boston East Site	East Boston
4	"Split Site" Option	East Boston/South Boston

The pertinent site data for each of the alternatives have been identified and presented in the following site profiles. Each of the site profiles includes: a description of the site; existing conditions; and a statement of the program capabilities of the alternative relative to criteria established in Section 2.4 of this report.

The profile characteristics identified for each alternative and utilized for site comparison are listed below:

Location, Availability, and Context

a) Site Address
b) Assessors Number and USDS Map Code
c) Ownership
d) Acquisition Strategy
e) Land and Water Uses
f) Compatibility to Surrounding Land Uses
g) Proximity to Supporting and Ancillary Facilities

Existing Conditions and Facilities

a) Parcel Size
b) Parcel Condition
c) Condition of Existing Structures
d) Subsoil Conditions
e) Marine Conditions
f) Water Depth
g) Water Quality

Accessibility

a) Water Access
b) Highway and Public Transit Access
c) Airport Access
d) Capacity of Local Street System
e) Impact of Traffic on Neighborhood
f) Effect of Third Harbor Tunnel
g) On-Site Parking and Circulation

Legal/Administrative Constraints

a) Zoning
b) Regulatory or Administrative Constraints
c) Easements or Other Deed Restrictions

Anticipated Costs and Revenues

a) Acquisition Costs
b) Capital Improvement Costs
c) Operation and Maintenance Costs

A detailed presentation of this information for each site is included in Appendix III. The results of this detailed analysis is presented below.

3.2.1 East Boston Piers Alternative

Site Description

The East Boston Piers site (Figure 3–4), 29 Marginal Street, currently owned by the Massachusetts Port Authority, is located on the former shipyard site. This location, referred to as Pier 5, also includes the land between piers 4 and 5. Immediately to the east is a ship repair facility and Logan Airport. To the north, across Marginal Street, the land rises approximately 30 feet in elevation to a residential neighborhood overlooking the piers and adjacent industrial area. The water side of the site overlooks the downtown Boston skyline and South Boston.

Current Conditions

The East Boston Piers site, unused for many years, is in poor repair. Pier 5 is seriously deteriorated and would require extensive repairs prior to any attempt to utilize it as a building site. Its granite bulkhead is deteriorated in many sections, and would also require repair. The land area behind the pier, while overgrown, appears solid; it is relatively flat with no existing buildings. Old railroad beds have been removed from the site. The land area (not including piers) directly behind Pier 5 to Marginal Street, and between the "Cashman" facility and the line of Pier 4 is approximately 3 acres. Water area from the edge of land to the bulkhead and pierhead line is approximately 10 acres.

Boston Lobster Facility

Program:

- o 81 slips
- o 185 parking spaces
- o summer storage for 200 traps
- o no winter trap storage
- o bait storage
- o ice storage
- o fuel available
- o holding/packing facility
- o maintenance/assembly
- o no dry storage for boats
- o independent landing area

Features:

- + Site owned by Massport
- - Requires land fill and 500 feet of reconstruction at Pier 5.
- - Boat and winter trap storage to be provided off site.
- - High wind and wave exposure - wave fence required.

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

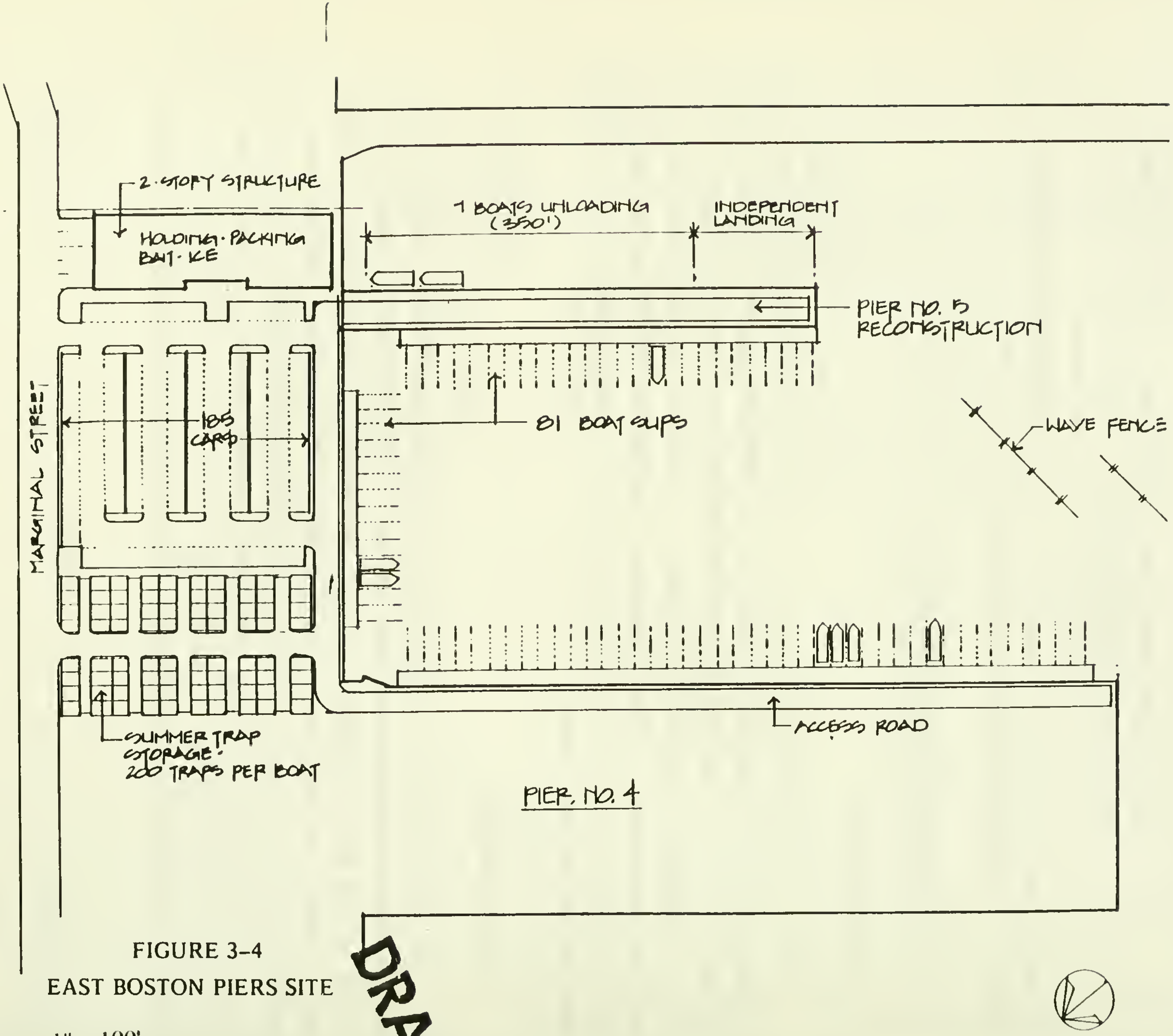


FIGURE 3–4
EAST BOSTON PIERS SITE

1" = 100'

DRAFT

The depth of the water along the East Boston Piers is among the deepest in Boston Harbor - more than 30 feet in most areas. Depths on the west side of Pier 5 site are somewhat shallower, according to the National Ocean Survey chart, ranging from 12 to 16 feet. The east side of Pier 5 is approximately 30 feet. Some limited dredging may be required if Pier 5 is to be removed or relocated.

Program Capabilities

As detailed in Figure 3-4, the East Boston Piers are capable of accommodating the entire summer program requirements earlier outlined in Section 2.4.

Winter trap storage and dry boat storage would require accommodations off-site. Waterfront construction would include the reconstruction of Pier 5 (510 linear feet), reconstruction of Pier 4 (820 linear feet) and infill of approximately 5,000 square feet of pier at the eastern edge of the site. Wave protection would also be required.

3.2.2 South Boston/MBTA Alternative

Site Description

The South Boston site, 680 East First Street, is located on the Reserve Channel opposite the Boston EDIC property (Figure 3-5). This site is currently the home of 29 lobstering boats, docked at the Cardinal Medeiros Dock (current home of the Boston Harbor Lobstermen's Coop). The site's land side borders East First Street, which connects with downtown Boston via Summer Street. Industrial use characterizes the abutting properties on both sides. The area is currently zoned W-2 and permits the proposed uses. Although there are some residential properties along East First Street, the portion of the site required for a lobster facility is well away from the street; it is unlikely that it would be visible from any nearby residential properties.

Current Conditions

The MBTA Power Plant Site in South Boston is in relatively better condition than the other two sites. A new floating dock has been built by the lobster fishermen on the east side of the pier. Between the north side of the pier and the Federal navigational channel are several abandoned coal hoppers which, if removed, could provide additional

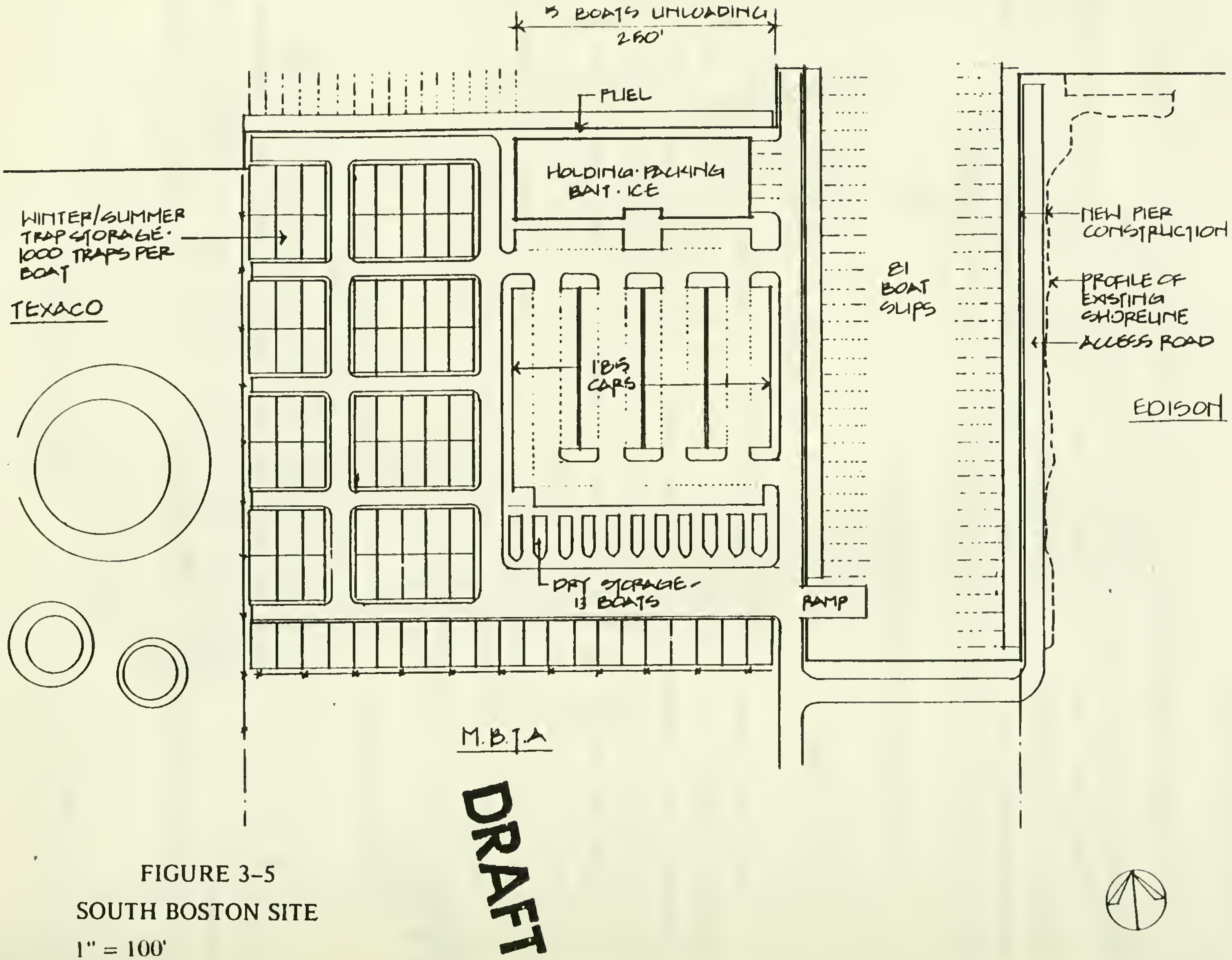


FIGURE 3-5
SOUTH BOSTON SITE
1" = 100'

DRAFT

Boston Lobster Facility

Program:

- o 81 slips
- o 185 parking spaces
- o summer storage for 200 traps
- o winter trap storage
- o bait storage
- o ice storage
- o fuel available
- o holding/packing facility
- o maintenance/assembly
- o dry storage for 13 boats
- o independent landing area

Features:

- + Entire program may be accomodated on site.
- + Site affords wind and wave protection
- - Site is currently owned by the MBTA Road access will be required across Edison property.
- - 600 feet of new pier construction required.

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

docking space. The land area is flat and open and is currently used for lobster trap and bait storage. The only permanent building on the site is the abandoned power plant at the East First Street end of the site. However, as will be discussed, long-range plans by the MBTA or Boston Edison could preclude use as a permanent lobster terminal.

The land area of this site, calculated from BRA maps, is approximately 19.7 acres. Water area out to the pierhead line is approximately 4.2 additional acres. The site has over 1,300 feet of water frontage as measured from the power plant to the Boston Edison property on the west.

The depth of the water at the pierhead line is given at 32 feet according to the National Ocean Survey chart. The depth of the area where the current dock is located is approximately 15 feet.

Program Capabilities

All of the program requirements can be accommodated on a 4.6 acre portion of the site (Figure 3-5). Waterfront construction required would include reconstruction of 550 feet of pier at the northern edge of the site as well as 600 feet of new pier construction at the easternmost edge of the site.

3.2.3 Old Boston East Alternative

Site Description

The Old Boston East Site (Figure 3-6), 102-150 Border Street, is located in East Boston at the southern end of Border Street near Central Square. This site, currently owned by the City of Boston, has been vacant for many years. There are no specific plans for its future use. Formerly the location of a shipyard and a coal wharf, current zoning permits the proposed uses. The site is separated from the residential neighborhood by a block characterized by commercial and industrial uses. Access to this site would most likely require some travel through residential areas; however, the impacts would appear to be minor.

Current Conditions

The Old Boston East Site is characterized by seriously deteriorated and collapsed piers and dry docks. Evidence of past fires on the piers is also to be found. The removal of the old piers and docks is likely to be expensive. The land area between the piers and

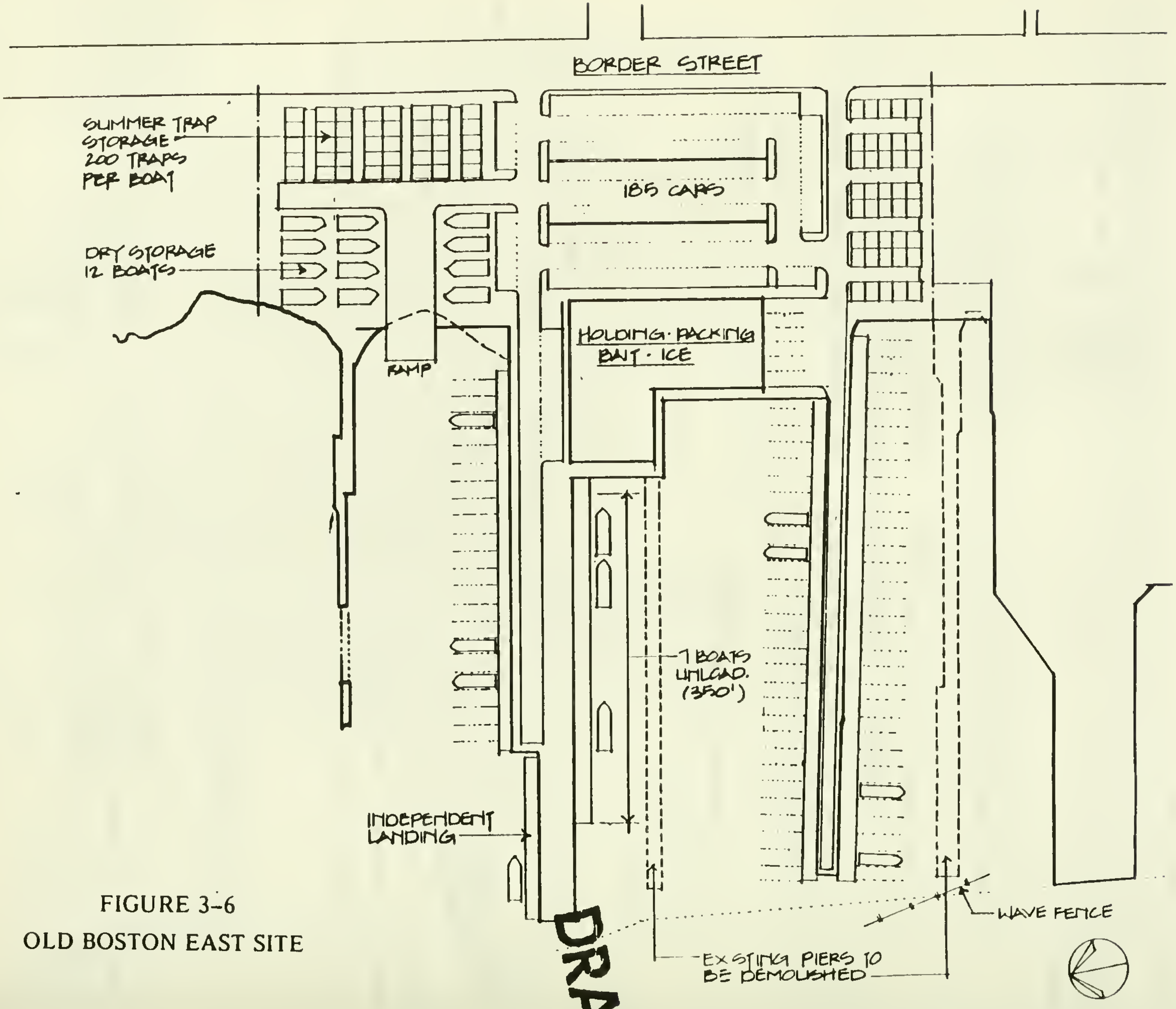

BORDER STREET
SUMMER TRAP STORAGE 200 TRAPS PER BOAT
DRY STORAGE 12 BOATS
185 CARS
HOLDING · PACKING BAIT · ICE
RAMP
7 BOATS UNLOAD. (350')
INDEPENDENT LANDING
WAVE FENCE
EXISTING PIERS TO BE DEMOLISHED

FIGURE 3-6

OLD BOSTON EAST SITE

DRAFT

Boston Lobster Facility

Program:

- 81 slips
- 185 parking spaces
- summer storage for 200 traps
- no winter trap storage
- bait storage
- ice storage
- fuel available
- holding/packing facility
- maintenance/assembly
- dry storage for 12 boats
- independent landing area

Features:

- Site presently owned by City of Boston.
- Requires demolition of 1000 feet of existing piers and substantial reconstruction of 1000 feet of existing piers.
- Winter trap storage to be provided off site.
- High wind and wave exposure - wave fence required.

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

Border Street is overgrown with vegetation, but is relatively flat. There are currently some small buildings on the Border Street edge of the property. Views out from the site overlook the Charlestown Navy Yard.

The land area between Border Street and the water's edge is approximately 4.02 acres. Water area between the bulkhead and pierhead lines is approximately 11.19 acres. The parcel has slightly under 700 feet of frontage along Border Street.

The depth of the water at the pierhead line is given at 27 feet according to the National Ocean Survey chart. The depth of the northern portion of the site decreases to 14 feet, while the southern half, where the old piers are located gets as shallow as 3 feet. Presumably this area among the deteriorated piers has not been dredged for some time.

Program Capabilities

The Old Boston East Site is capable of accommodating the entire summer program (Figure 3-6). However, winter trap storage and some dry boat storage would have to be provided off-site. Waterfront construction would include reconstruction of 1,100 linear feet of existing pier and the demolition and removal of another 1,000 linear feet of pier. Wave protection would be required at this location.

3.2.4 Split Site Alternative (East Boston Piers/South Boston/MBTA Site)

Site Description

This alternative combines sites 1 and 3: The East Boston Piers Site and the South Boston/MBTA Site (Figure 3-7). The East Boston Site is owned by Massport and the South Boston Site by the MBTA. This option would place the lobster fishermen in two locations, with an unloading facility located at the East Boston Site and the majority of docking at South Boston.

Current Conditions

Both areas are flat and open. No permanent building currently exists on the site required for the lobster facility.

Boston Lobster Facility

Program.

- 81 slips
- 185 parking spaces
- summer storage for 200 traps
- winter trap storage
- bait storage
- ice storage
- fuel available
- holding/packing facility
- maintenance/assembly
- dry storage for 31 boats
- independent landing area

Features:

- + Traditional ties between lobstering and neighborhood are maintained.
- + Entire program may be accomodated on site.
- + MBTA water access may be maintained.
- - South Boston site must be acquired from MBTA.
- - 500 feet of pier demolition is required at East Boston.
- - High wind and wave exposure on East Boston site.

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

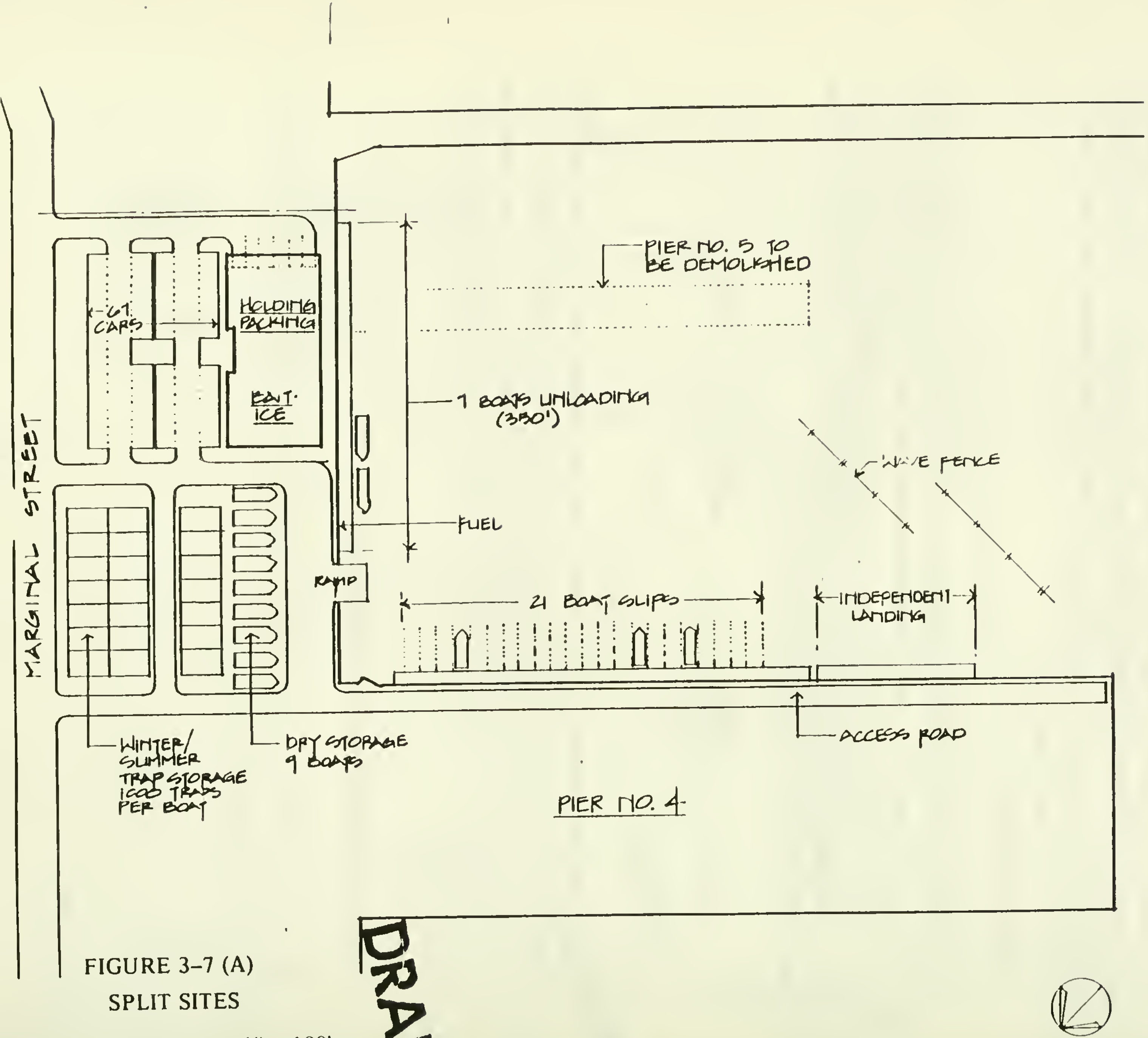


FIGURE 3-7 (A)
SPLIT SITES
East Boston 1" = 100'

DRAFT

Boston
Lobster
Facility

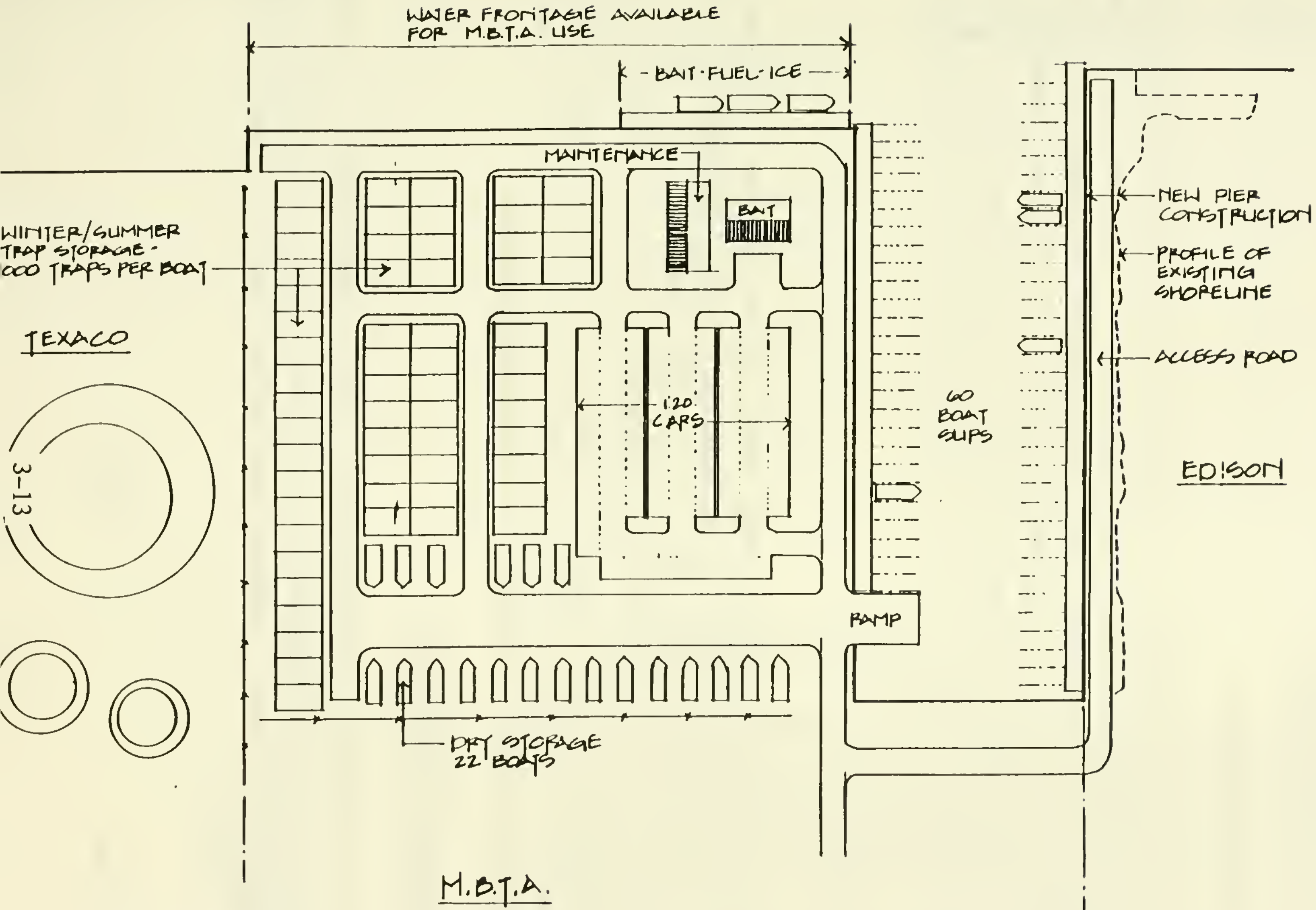


FIGURE 3–7 (B)
SPLIT SITES

South Boston 1" = 100'

DRAFT

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

Program Capabilities

The combined sites would provide sufficient area to accommodate all program needs (Figure 3-7). Waterfront construction at East Boston would include the demolition of Pier 5 (510 linear feet), the reconstruction of 400 feet of Pier 4 and some wave protection. At South Boston, construction of 600 feet of new pier would be required in the event that the MBTA required access to the harbor at some point in the future. Otherwise, no major work is required in this location.

3.3 Comparative Analysis

From the above descriptions, it is evident that each of the four potential site combinations can satisfy the program requirements outlined in Section 2.4 of this report. Accordingly, a preferred alternative must be chosen based upon a comparison of differing site conditions and a weighting of the relative importance of each differing element.

Each of the following criteria vary for some of the potential sites. A detailed listing of the characteristics of each site is found in Appendix III; comparison in matrix format is presented in Table 3-1.

Ownership

While all of the parcels are publicly owned, only the East Boston Site has been offered by the owner (Massport) for the proposed use. The South Boston/MBTA site may not be viable if Boston Edison is allowed to go ahead with its plans to build a coal conversion plant or if the MBTA decides to generate its own power. The City of Boston has not indicated its position regarding the location of a lobster terminal on the Old Boston East Site. The combined-site alternative, also based on the use of the South Boston/MBTA site, may not be viable for the reasons mentioned above.

Compatibility of Area Uses

Both the South Boston site and the Old Boston East site have no residential neighbors, but are abutted by properties characterized by light and heavy industrial uses. The East Boston Site abuts a residential neighborhood. However, a steep embankment

Boston Lobster Facility

Target Program	East Boston	South Boston	Old East Boston	Split Boston
81 slips	X	X	X	X
185 parking spaces	X	X	X	X
summer storage for 200 traps	X	X	X	X
winter trap storage for 800 traps	0	X	0	X
bait (4,860 s.f.)	X	X	X	X
ice storage	X	X	X	X
fuel	X	X	X	X
holding/packing facility (20,000 s.f.)	X	X	X	X
Maintenance/assembly	X	X	X	X
dry storage for 35 boats	0	13	12	31
independent landing area	X	X	X	X

* parking is based on two spaces per boat and 25 additional spaces for the holding facility

HMM Associates, Inc.
Environmental Engineers

Tsoi/Kobus & Associates, Inc.
Architects

DRAFT

separates the East Boston Piers from the adjoining residential neighborhood. With few exceptions, homes along the embankment have access via Brigham Street, while the proposed site is accessed from Marginal Street.

Parcel Size

All of the summertime docking and land side requirements of the fishermen, including a 20,000 square foot holding facility, may be accommodated on each of the four sites under consideration. The Old Boston East and East Boston Piers sites are not adequately sized to accommodate winter trap storage or dry boat storage; however, each of these functions could be readily provided for at another location.

Parcel and Waterside Conditions

The land portion of all the parcels appears to be suitable for the proposed use. All sites are relatively flat, and any existing buildings are insignificant.

The condition of the waterside portion of the sites, however, varies. The Old Boston East site would involve the most extensive waterside work, requiring complete removal of two piers and the reconstruction of two others. Locating the lobster facility at the East Boston Piers would necessitate reconstruction of Pier 5 and the eastern edge of Pier 4. Accommodation of the entire fleet at South Boston would require the construction of a new pier along the eastern edge of the site. The split scheme scenario potentially involves the least amount of waterfront construction, only requiring reconstruction of one side of East Boston's Pier 4. It should be noted, however, that should the MBTA or Boston Edison require access to the harbor at some future date, an additional new pier would be needed at the South Boston site.

Water Depth

With the exception of the portion of Old Boston East where the docks have collapsed, water depth is more than adequate at all sites. Significant dredging of the Old Boston East site would be required before docking could be accommodated.

Marine Protection

Marine conditions at the South Boston site are favorable for the protection of the docked fleet. This is due to the physical layout of the Reserve Channel and the wind protection offered by large buildings in the area. While wind and wave exposures at the other two sites are not severe, some form of breakwater or wave reduction system would be required to protect the docked fleet. The combined-site alternative would not require any additional protection for the South Boston portion of the fleet, but would for the East Boston portion. However, under extreme weather conditions, the East Boston fleet could find safe refuge at the South Boston Site.

Transportation Issues

Because of the low level of traffic expected to be generated, traffic impacts to adjacent residential neighborhoods appear to be minor for each site. The Third Harbor Tunnel will facilitate transportation between South Boston and East Boston. Although it will decrease the shipment time from South Boston to Logan Airport, the tunnel would not appear to give any of the site a significant advantage over the others.

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

Thomas P. Glynn
General Manager
Transportation Building
Ten Park Plaza
Boston, Massachusetts 02116

April 13, 1989

Mr. David Davis
Executive Director
Massachusetts Port Authority
Ten Park Plaza
Boston, MA 02116

Re: Tenure of Lobster Fleet at South Boston Power Complex

Dear Dave,

I wish to communicate for the record the MBTA's present and future plans for its South Boston Power Complex, as that site relates to the planning effort on behalf of the Boston Harbor lobster fleet. This is to advise you that the MBTA will continue to accommodate the current vessel operators at the South Boston site for the foreseeable future.

Recent History and Current Plans. As you know, since 1983, the lobstermen have occupied approximately 96,000 s.f. of MBTA property at our Power Complex property on First Street in South Boston, on a tenancy-at-will basis. The MBTA continues to operate at that location a power generator and switching equipment essential to the operation of the MBTA's rapid transit system. Sometime in the next few years, the MBTA plans to have demolished the 1930's power plant which occupies a substantial part of the site.

Earlier this year, the MBTA advertised for proposals to lease for maritime use a 260,000 s.f. parcel (Parcel A-1) on the water's edge of this Power Complex property. Some of this property is currently used by the lobstermen for trap storage, workspace, parking and other functions. However, a 27,100 s.f. parcel (Parcel A-2) adjacent to the inlet was specifically excluded from the offered parcel and reserved for continued use by the lobstermen. The MBTA's RFP also noted that a proponent for the larger parcel must be compatible with lobster operations, and include repair of the seawalls, dockage and wharf area used by the lobstermen as part of its infrastructure improvements package.

The MBTA intends to identify additional acreage on site for the relocation of lobster trap storage and parking before it executes a lease with the successful proponent for the 260,000 s.f. parcel.

Longer Range Issues. Among the other possible activities on the site in the future may be the construction of a new power facility, which again may require the MBTA to reconfigure the lobstermen's trap storage and parking area. In the event that construction of a power facility or some other major, water dependent use would preclude continued operation by the lobster vessels, either temporarily or permanently, the lobster fleet would be given as much notice as possible to plan for dockage elsewhere.

I hope this information is useful to you as you complete your environmental and legislative reports on proposed facilities for 44 vessels of the Boston Harbor lobster fleet on Massport property in East Boston.

Sincerely,

Thomas P. Glynn
General Manager

cc: Doug Husid
Al Raine

APPENDIX D

CHAPTER 91 RESEARCH

APPENDIX D
CHAPTER 91 RESEARCH

Licensing/History of Use

The licensing history of this area is extensive. Licenses issued by the Harbor and Lands Commission were found, dating back to the mid–1830's. At that time, the area now known as East Boston was called Noddles Island was owned almost entirely by the East Boston Company. The East Boston Company had improved the island and divided it up into lots to promote development. The Company built a road on the shoreline called Marginal Street. Figure D–1 shows a map of a section of East Boston. The East Boston Piers site is contained within the lots marked Eastern Railroad Company, Locke and Ripley, E. Adams, S.E. Benson, P. Dunbar, J. Mariner, B. Lamson, J. Brown, and Sumner and Fosdick, in the tidal zone or under water. The leases do not mention what the proprietors used the lots for, although reference to the use of at least three of the lots was found.* The wharf built on the Locke and Ripely lot was used for a wood and lumber wharf. The Eastern Railroad unloaded coal and wood in its lot. In addition, B. Lamson built a wharf on his lot, later merged with the Grand Junction Wharves, on which he built a steam mill for sawing mahogony, veneering, etc.

Licenses indicate that, as early as 1837, the area of East Boston Piers referred to as the Grand Junction Wharves was controlled by the Boston and Albany Railroad. Tracks had been laid, presumably by the Eastern Railroad and the Grand Junction Railroad, previous owners of sections of the site. Piers in the area were used to transport goods from rail to the sea or vice versa. That it was an active port area is evidenced by the regular repairs of piers and seawalls, dredging of docks and expansion of piers throughout the 1800s. A map of Boston Inner Harbor from 1914 listed the following shipping lines using the wharves:

- Leyland Line to Liverpool
- Leyland line to Manchester
- American Mediterranean Line from Calcutta
- Cunard Line to Liverpool

---

* William Sumner, A History of East Boston, 1836.

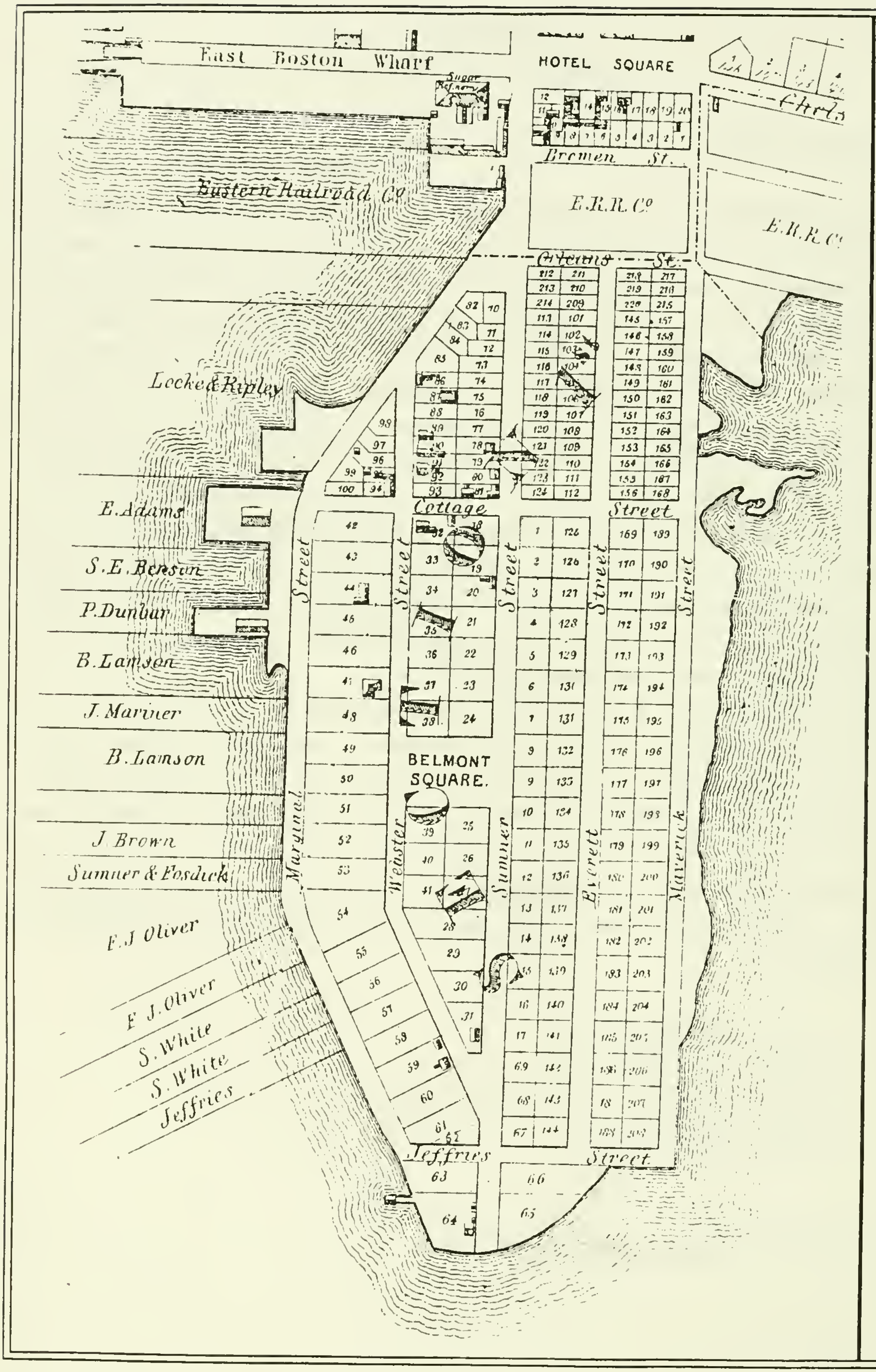


Figure D-1
EAST BOSTON PIERS SITE AS IT EXISTED IN 1837
(From R.H. Eddy Plan)

- Navigozione Generale Italiano Line to Mediterranean
- North German Lloyd Line to Manchester
- Federal and Shine Line from Australia and New Zealand

The area continued to be controlled by the Boston and Albany Railroad Company with shippng lines leasing space.

Activity continued in the early 1900's after the Boston and Albany Railroad merged with the New York Central and Hudson River Railroad Company. No repair licenses were found in the later 1900's, as activity in the area declined. The railroad merged again in 1935 to become part of the New York, New Haven and Hartford Railroad System. In the 1940's, some repairs were done at Piers No. 4 and 5 and a Gantry Crane was placed on Pier No. 5. Again, in 1962, the railroad merged with the Pennsylvania New York Central Transportation Company to become the Penn Central Railroad. With each merger, the new railroad company assumed responsibility for the piers.

Activity continued in the early 1900's after the Boston and Albany Railroad merged with the New York Central and Hudson River Railroad Company. No repair licenses were found in the later 1900's, as activity in the area declined. The railroad merged again in 1935 to become part of the New York, New Haven and Hartford Railroad System. In the 1940's, some repairs were done at Piers No. 4 and 5 and a Gantry Crane was placed on Pier No. 5. Again, in 1962, the railroad merged with the Pennsylvania New York Central Transportation Company to become the Penn Central Railroad. With each merger, the new railroad company assumed operating responsibility for the piers.

The Massachusetts Port Authority (Massport) acquired the East Boston Piers in 1956 as part of the original port properties. In February, 1970, Massport took over operation of the facility, proceeding to demolish the structures on Piers 3 and 4, the grain elevator and water tower, and to remove all non-essential trackage.

The proposed project, a waterfront park and a lobster terminal, would utilize Piers 4 and 5 and their associated backland. Plans for the remaining piers and backland are currently being analyzed by a team of consultants under contract with Massport.

Phase II Information

A map compiled by the Directors of the Port in 1914 indicated that one of these Commonwealth tidelands was located between Pier 1 and Lewis Street. The designation of this part of the area as Commonwealth flats may have been due to some court decisions settling discrepancies resulting from the original sale of land to the East Boston

Company. The deed for the land did not clearly state the boundaries of the East Boston Company land in tidelands areas. It may also have resulted from the 100 rod rule. Areas of tidelands further than 100 rods (1,650 feet) from the high water shoreline can be designated Commonwealth tidelands even if they are above the low water shoreline.

In conclusion, all evidence indicates that the earliest known shoreline is landward of the site boundary; therefore, all of the site is tidelands along Piers 3, 4, and 5 and the Directors of the Port map indicates the extent of Commonwealth tidelands by Pier 1 and Lewis Street. The historic extreme low water line shown on Figure 5.1-1 delineates between private and Commonwealth tidelands.

HMM ASSOCIATES INC.

NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J Stuart Date: May '88

Type of Source Material: [✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: State Library - Special Collections

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: ______ Issuing Authority: ______ (H&L)(D of P)(WPL)(DPW)(DEQE)
2. Licensee: ______
3. Date of Issuance: ______ Scale: ______
4. Special Conditions: Y N Plan Available: Y N
5. Activity Authorized: ______
6. Historic/Current Shorelines: HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: R.H Eddy (Engineer) Date: 1837

Site Location: East Boston Piers 1-5 Scale: ~~[illegible]~~

Historic Shorelines: ______ Structures: streets and lots

Comments: Map of East Boston Piers site with streets and lots ~~[illegible]~~ ~~[illegible]~~ labeled including water lots. Included

2150/1278E in text as Figure 5.1-2.

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park

HMM Ref. No.: 1752-138

Researcher: Daniel J Stewart

Date: May '88

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2768 Issuing Authority: (H&L)(D of P)(WPL)[✓ (DPW)](DEQE)
2. Licensee: New York, New Haven & Hartford Railroad System
3. Date of Issuance: June 18, 1946 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized:
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference:

Date:

Site Location:

Scale:

Historic Shorelines:

Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.
NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May '88

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2558 Issuing Authority: (H&L)(D of P)(WPL)[✓ (DPW)](DEQE)
2. Licensee: ~~Boston and~~ New York, New Haven & Hartford Railroad System
3. Date of Issuance: November 24, 1942 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: Construct dolphins at pier no 5
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May '88

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterways Regulation in

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2727 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston, Lynn, Revere Beach Railroad Company
3. Date of Issuance: April 15, 1903 Scale: 1"=200'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: dredge and construct coal pocket ~~Co~~ parcel adj~~acent~~
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)
Parcel is adjacent to Massport property contains reference to Parham Survey of 1835

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

HMM ASSOCIATES INC.

ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May '88

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 592 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad Company
3. Date of Issuance: March 2, 1881 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized:
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster ~~Park~~ Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J [illegible] Date: May '88

Type of Source Material: (Map) [✓ (License)] (Plan) (Chart) (Text)

Location of Source Material: Suffolk County Registry of Deeds

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 526 Issuing Authority: [✓ (H&L)] (D of P) (WPL) (DPW) (DEQE)
2. Licensee: Boston and Albany RR Company
3. Date of Issuance: December 10, 1881 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: rebuild sea wall on northwest side of pier no. 6
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.

NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport [illegible] Terminal and Waterfront Park
HMM Ref. No.: 1752-135

Researcher: Daniel J. Stuart
Date: April '88

Type of Source Material: (Map)([✓ License])(Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: [illegible] 5 _ 5
Issuing Authority: ([✓ H&L])(D of P)(WPL)(DPW)(DEQE)

2. Licensee: Boston and Albany Railroad

3. Date of Issuance: December 20, 1880
Scale: —

4. Special Conditions: Y [✓ N]
Plan Available: Y [✓ N]

5. Activity Authorized: extend its dock no 3 and enclose by substantial sea wall or bulk heads on three sides and construct a pile platform

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference:
Date:

Site Location:
Scale:

Historic Shorelines:
Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal and Park HMM Ref. No.: 1756-139

Researcher: Daniel J. Stuart Date: April '83

Type of Source Material:
(Map)([✓ License])(Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2435 Issuing Authority:
([✓ H&L])(D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad, the New York Central and Hudson River Railroad
3. Date of Issuance: December 15, 1905 Scale: —
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: reconstruct a portion of the westerly side of pier no.
1
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

hm HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: [illegible] Date: April '88

Type of Source Material: (Map)[✓ (License)][✓ (Plan)](Chart)(Text)

Location of Source Material: Registry of Deeds, Suffolk County

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 1705 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad Company
3. Date of Issuance: September 18, 1894 Scale: 3/16" = 1'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: repair pier no 4
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES [✓ PIER/BULK LINES]
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

hmm HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Logistic Terminal & Park HMM Ref. No.: 1752-138

Researcher: [illegible] Stuart Date: April '88

Type of Source Material: (Map)[✓ (License)][✓ (Plan)](Chart)(Text)

Location of Source Material: Registry of Deeds Suffolk County

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 398 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad Company
3. Date of Issuance: January 23 1873 Scale: 1" = 10'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: dredging of Pier No. 5
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

HMM ASSOCIATES INC.

NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel Stuart Date: April '88

Type of Source Material:
(Map)[✓ (License)][✓ (Plan)](Chart)(Text)

Location of Source Material: Registry of Deeds, Suffolk County

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 399 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad Company
3. Date of Issuance: January 31, 1878 Scale: 1"=80'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: Cover with a pile structure whole of dock No. 2
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

TIDELANDS RESEARCH INFORMATION

Project: Massport Lonstu Terminal & Waterfront Park HMM Ref. No.: 1752-138

Researcher: Daniel J Stuart Date: April '83

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3439 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany Railroad, the New York Central and Hudson River Railroad Comp
3. Date of Issuance: June 13, 1910 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: build pier no 5 on piles; build a pile structure in dock no 5; dredge to a depth of 35 feet mlw at Docks no 4 and 5
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)
plan could not be located @ DEQE

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.

NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport [illegible] Terminal and Waterfront Park HMM Ref. No.: 1753-133

Researcher: Daniel J Stewart Date: April '93

Type of Source Material: (Map) [✓ (License)] (Plan) (Chart) (Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3394 Issuing Authority: [✓ (H&L)] (D of P) (WPL) (DPW) (DEQE)
2. Licensee: Boston and Albany R.R., the New York Central and Hudson River RR lessee
3. Date of Issuance: August 5, 1909 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: build a pile and timber structure and dredge at docks nos 4 and 5
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

hm HMM ASSOCIATES INC.

ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Waterfront Park

HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart

Date: April '88

Type of Source Material: (Map) [✓ (License)] (Plan) (Chart) (Text)

Location of Source Material: Suffolk County Registry of Deeds

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3365

Issuing Authority: [✓ (H&L)] (D of P) (WPL) (DPW) (DEQE)

2. Licensee: Boston & Albany RR, the New York Central & Hudson River Railroad lessee

3. Date of Issuance: June 9, 1909

Scale:

4. Special Conditions: Y [✓ N]

Plan Available: Y [✓ N]

5. Activity Authorized: rebuild and extend one pier two piers easterly of Cunard Pier

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)
plan couldn't be located at the DEQE

B. HISTORIC MAP/CHART

Reference:

Date:

Site Location:

Scale:

Historic Shorelines:

Structures:

Comments:

HMM ASSOCIATES INC.
NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Waterfront Park HMM Ref. No.: 1753-133

Researcher: Daniel J. Stuart Date: April '89

Type of Source Material: (Map)[✓ License](Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterways Regulation

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3325 Issuing Authority: [✓ H&L](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany et. al.
3. Date of Issuance: Oct 12, 1908 Scale: 1" = 200'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: reconstruct Cunard Pier
6. Historic/Current Shorelines:
   HHW HLW MHW [✓ MLW] ELW HARBOR LINES PIER/BULK LINES
   at edge of Sea wall
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

hmm HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Waterfront Park

HMM Ref. No.: 1752-138

Researcher: Daniel J Stewart

Date: April '88

Type of Source Material: (Map)[✓ (License)](Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterway Regulation

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3099 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany R.R, et al
3. Date of Issuance: August 15, 1906 Scale:
4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]
5. Activity Authorized: rebuild pier at end of Clyde Street and dredge docks adjacent to the pier
6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)
plan could not be located at DEQE

B. HISTORIC MAP/CHART

Reference:

Date:

Site Location:

Scale:

Historic Shorelines:

Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.

NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1758-133

Researcher: Daniel J Stuart Date: May '88

Type of Source Material: (Map)[✓ (License)][✓ (Plan)](Chart)(Text)

Location of Source Material: Suffolk County Registry of Deed (license), DEQE Wetlands and Waterways Regulation (Plan

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2871 Issuing Authority: [✓ (H&D)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany RR, et al.
3. Date of Issuance: August 3, 1904 Scale: 1" = 100'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: reconstruct pier no 3
6. Historic/Current Shorelines:
   HHW HLW MHW [✓ MLW] 2 ELW [✓ HARBOR LINES] 1 PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)
   1 - Harbor line of ~~[illegible]~~ 1901
   2 - MLW at edge of ~~pier~~ bulkheads

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lonsites Terminal and Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: ________

Type of Source Material: ________
(Map) [✓ (License)] (Plan)(Chart)(Text)

Location of Source Material: ________

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2461 Issuing Authority: ________
[✓ (H&L)] (D of P)(WPL)(DPW)(DEQE)

2. Licensee: Boston and Albany RR, et. al

3. Date of Issuance: ________ Scale: ________

4. Special Conditions: Y [✓ N] Plan Available: Y [✓ N]

5. Activity Authorized: rebuild sea wall at head of dock no. 1

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: ________ Date: ________

Site Location: ________ Scale: ________

Historic Shorelines: ________ Structures: ________

Comments:

2150/1278E

HMM ASSOCIATES INC.
NGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park
HMM Ref. No.: 1752-138
Researcher: Daniel Stuart
Date: May '88
Type of Source Material:
(Map)[✓ (License)][✓ (Plan)](Chart)(Text)
Location of Source Material: Suffolk County Registry of Deeds (license)
DEQE Wetlands and Waterways Regulation (plan)

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2538
Issuing Authority:
[✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston & Albany R.R. et. al.
3. Date of Issuance: December 13, 1901
Scale:
4. Special Conditions: Y [✓ N]
Plan Available: [✓ Y] N
5. Activity Authorized: enlarge and reconstruct pier no 4 and adjoining dock
6. Historic/Current Shorelines:
HHW HLW MHW [✓ MLW] ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference:
Date:
Site Location:
Scale:
Historic Shorelines:
Structures:
Comments:

2150/1278E

HMM ASSOCIATES INC.

ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May '88

Type of Source Material: (Map)[✓ (License)][✓ (Plan)](Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds (license)
DEQE Wetland and Waterway Regulations (plan)

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 2467 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany RR, et. al
3. Date of Issuance: August 23, 1901 Scale:
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: extension of east side of pier no1 and dock no 2
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

Reference: Date:

Site Location: Scale:

Historic Shorelines: Structures:

Comments:

2150/1278E

HMM ASSOCIATES INC.
IGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May '88

Type of Source Material: [✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterways Regulations

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: 3394 Issuing Authority: [✓ (H&L)](D of P)(WPL)(DPW)(DEQE)
2. Licensee: Boston and Albany RR, et al
3. Date of Issuance: August 5, 1909 Scale: 1" = 200'
4. Special Conditions: Y [✓ N] Plan Available: [✓ Y] N
5. Activity Authorized: build pile and timber structures and dredge docks 4 and 4
6. [✓ Historic]/Current Shorelines:
   HHW HLW MHW MLW [✓ ELW] [✓ HARBOR LINES] [✓ PIER/BULK LINES]
7. Comments: (Special Conditions, Legislative Authorization, etc.)
   Purham extreme low water line survey of 1835

B. HISTORIC MAP/CHART

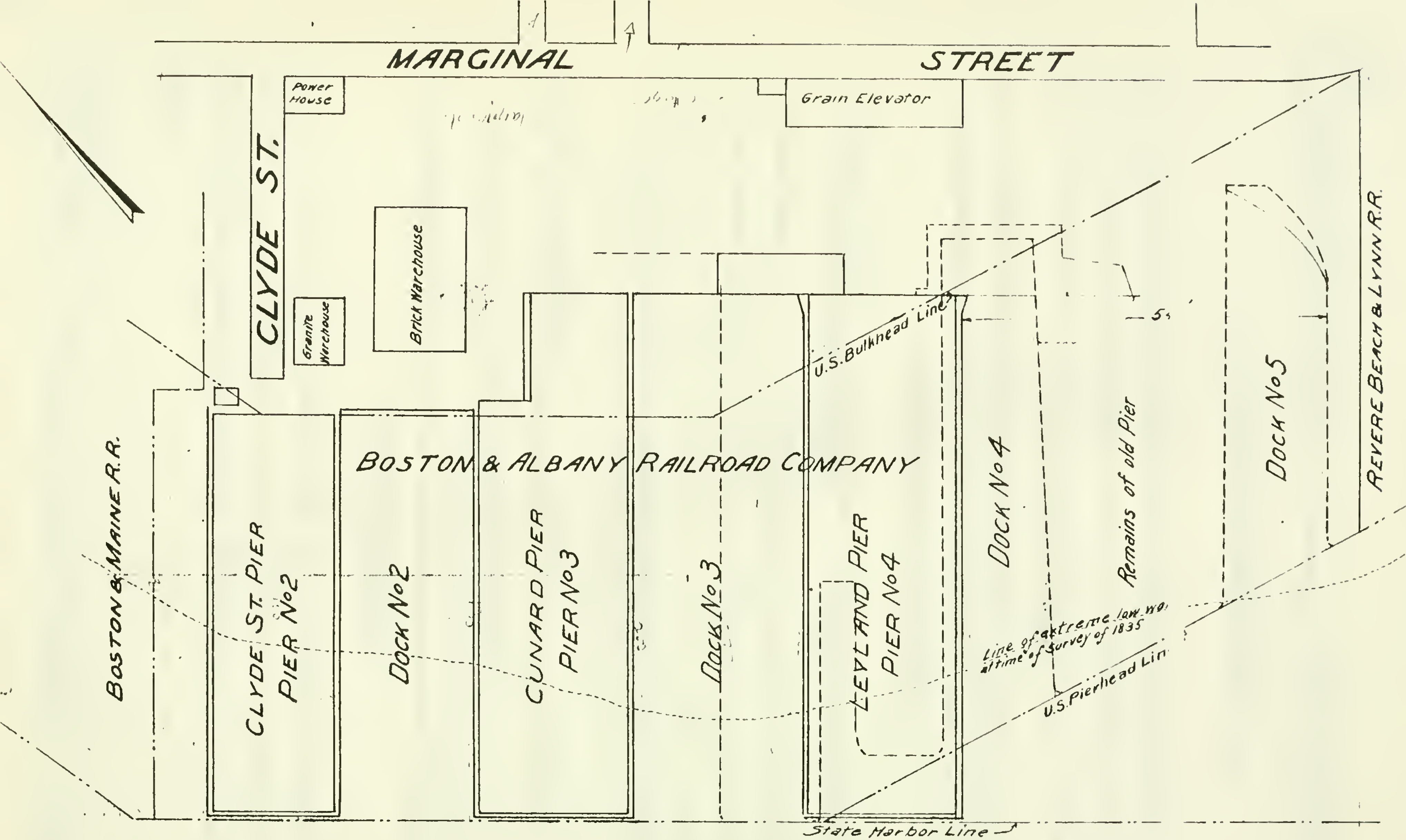
Reference: licence plan # 3394 Date: July 19 1909

Site Location: East Boston Piers 1-5 Scale: 1" = 200 ft

Historic Shorelines: Purham Survey (1835) Structures: East Boston Piers buildings, and streets

Comments: Line of extreme low water at time of survey in 1835. Attached are three pages. Page one is a section of the plan, page two is a copy of the Harbor and Lands approval and page three is a copy of the Chief engineers signature.

2150/1278E



GENERAL PLAN

Scale 1 Inch = 200 Ft.

o be filled after sheeting is in place

No. 3394.

Approved by Harbor and Land Comrs.

July 19. 1909.

Geo E. Smith.

Samuel M. Mansfield

Herman A. Harding

BOSTON AND ALBANY RAILROAD

N.Y.C. & H.R.R.R. Co. Lessee

PLAN OF

EXTENSION OF PLATFORMS AT HEAD OF DOCKS Nos 4 & 5

EAST BOSTON

New Piles shown thus ○

Old Piles to be removed shown thus ●

Old Piles to remain shown thus

'' July 19. 1909.

Geo E. Smith

Samuel M. Mansfield

Herman A. Harding

BOSTON AND ALBANY RAILROAD

N.Y.C. & H.R.R.R. Co. Lessee

PLAN OF
EXTENSION OF PLATFORMS AT HEAD OF DOCKS Nos 4 & 5
EAST BOSTON

New Piles shown thus .... ○
Old Piles to be removed shown thus .... ●
Old Piles to remain shown thus .... ○

Scale 1 Inch = 20 Feet.

Boston June 1909

Chief Engineer.

HMM ASSOCIATES INC.

IGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel Stuart Date: May '88

Type of Source Material: [✓ Map](License)(Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterways Regulation

---

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: ______ Issuing Authority: ______ (H&L)(D of P)(WPL)(DPW)(DEQE)
2. Licensee: ______
3. Date of Issuance: ______ Scale: ______
4. Special Conditions: Y N Plan Available: Y N
5. Activity Authorized: ______
6. Historic/Current Shorelines: HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

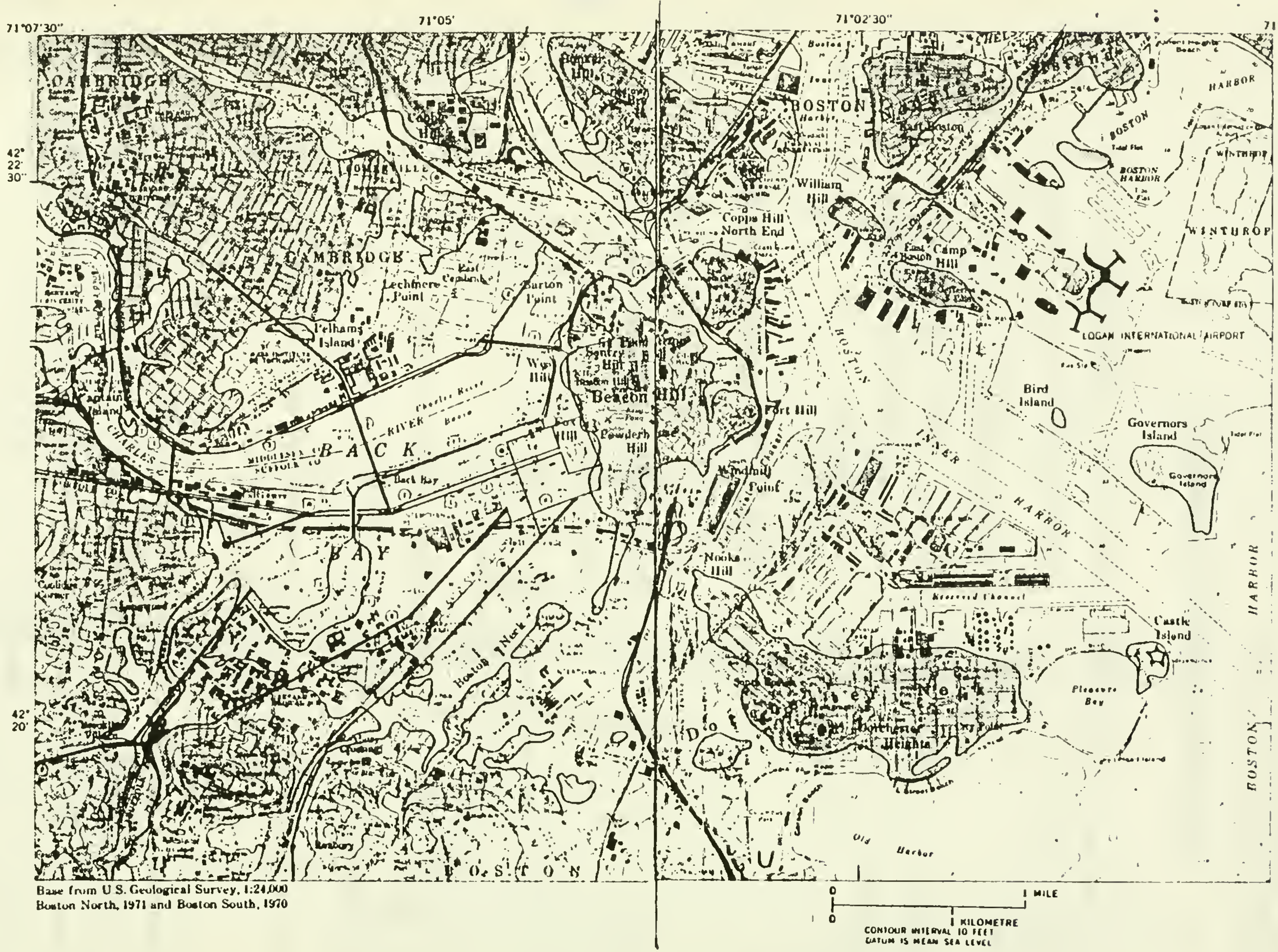
B. HISTORIC MAP/CHART

Reference: Geology and Early History of the Boston Area of Massachusetts Date: 1976

Site Location: Greater Boston Scale: 1:24,000

Historic Shorelines: 1630 shoreline Structures: roads piers & waterways

Comments: location of 1630 shoreline on basis of subsurface, ~~and~~ surface and historical data. A copy is attached



Base from U.S. Geological Survey, 1:24,000
Boston North, 1971 and Boston South, 1970

FIGURE 6.—Central Greater Boston, showing the mean-high-tide shoreline as it probably existed in 1630, on the basis of subsurface, surface, and historical data.

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1758-138

Researcher: Daniel J Stuart Date: May '88

Type of Source Material: DPW Earliest Known Shoreline Map
[✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: DEQE Wetlands and Waterways Regulations

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: ______ Issuing Authority: ______
(H&L)(D of P)(WPL)(DPW)(DEQE)

2. Licensee: ______

3. Date of Issuance: ______ Scale: ______

4. Special Conditions: Y N Plan Available: Y N

5. Activity Authorized: ______

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)

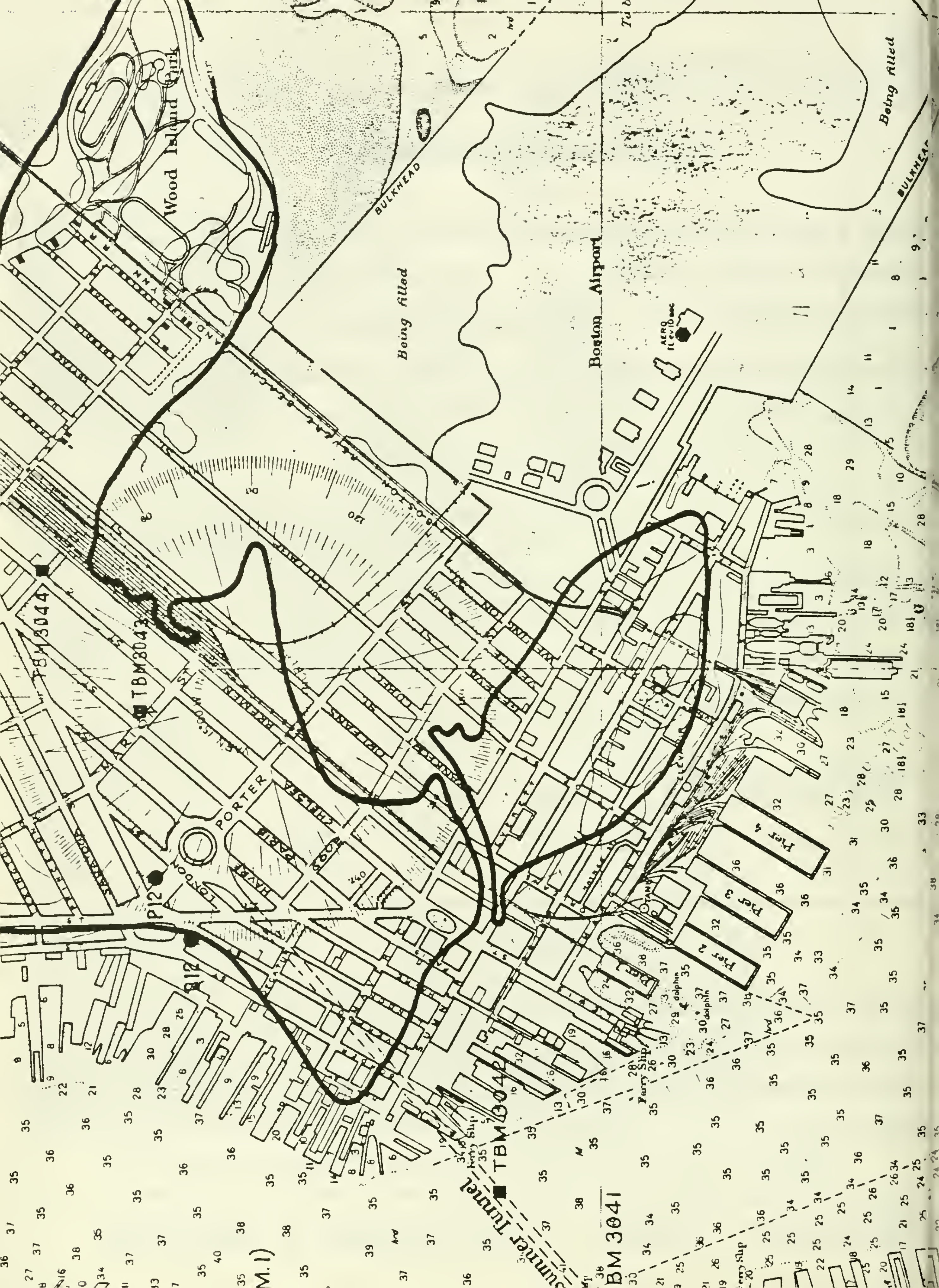
B. HISTORIC MAP/CHART

Reference: USGS map/DPW 1935 Date: July ~~15~~ 1935

Site Location: Boston Harbor Scale: 1/10,000

Historic Shorelines: earliest known shoreline Structures: includes roads, piers, bridges & water depth.

Comments: Earliest Known Shoreline of Boston Harbor as compiled from plans of Henry Pelham (1775), A.S. Wardsworth (1817), John G Hale (1813), U.S. Coast Survey (1847). Copy of East Boston Section attached (not to scale).


Wood Island Park
Being Filled
BULKHEAD
Being Filled
BULKHEAD
Boston Airport
AERO
TBM 3044
TBM 3043
TBM 3042
TBM 3041
P12
R12
PORTER
LONDON
HAVRE
PARIS
CHELSEA
BREMEN
ORLEANS
SUMNER
Pier 4
Pier 3
Pier 2
Ferry Slip
Ferry Slip
dolphin
dolphin
dolphin
Sumner Tunnel

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J Stuart Date: April '88

Type of Source Material:
[✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: Suffolk County Registry of Deeds

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: Issuing Authority:
(H&L)(D of P)(WPL)(DPW)(DEQE)

2. Licensee:

3. Date of Issuance: Scale:

4. Special Conditions: Y N Plan Available: Y N

5. Activity Authorized:

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

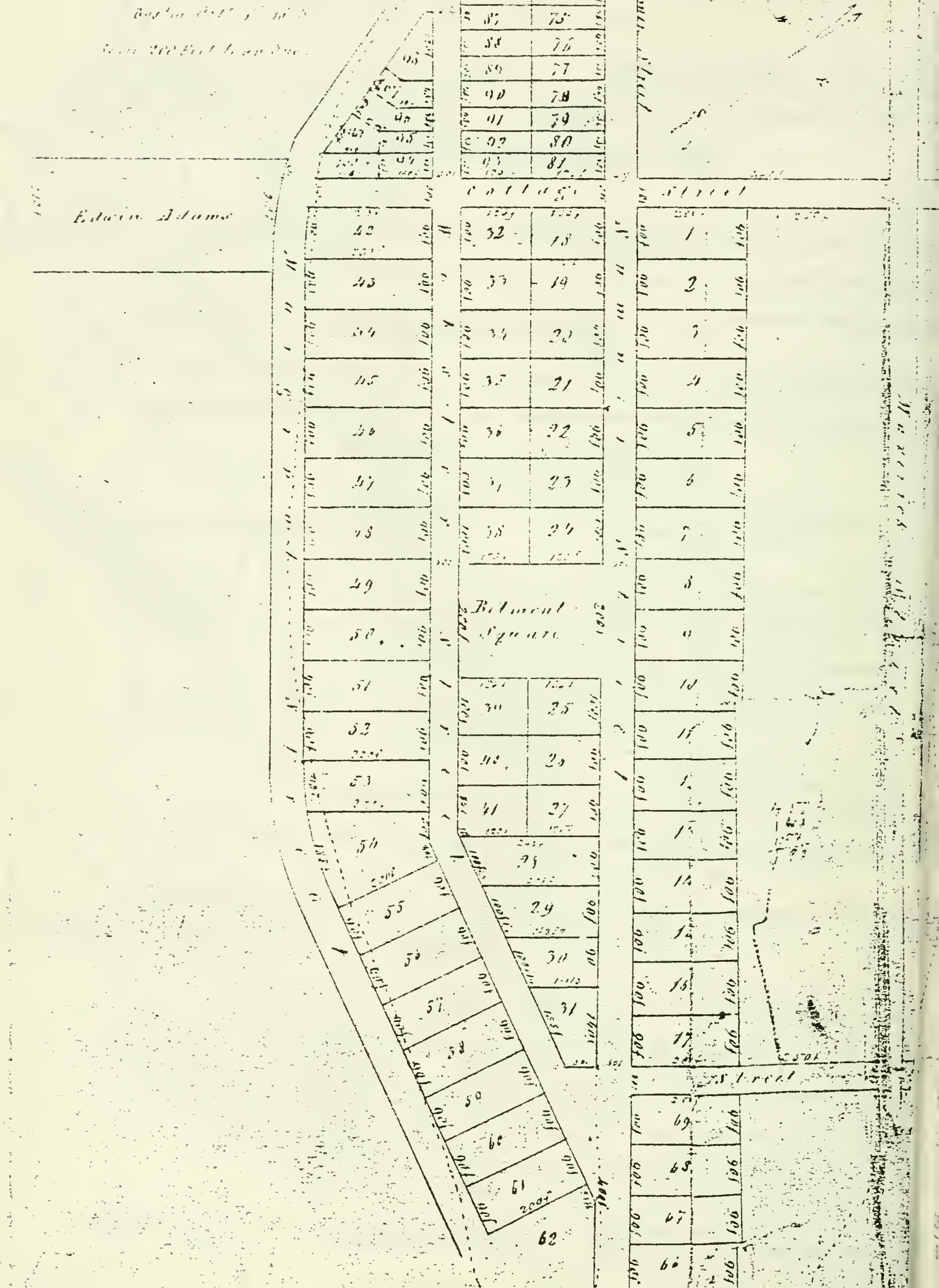
Reference: S. P. Fuller Plan, ~~[illegible]~~ Date: 1833

Site Location: East Boston Scale: 1" = 200'

Historic Shorelines: Historic HWM Structures: roads and lots

Comments: Shows original configuration of Marginal street and a dotted line indicating the high water mark prior to road construction. Attached is Section 1 of the S.P. Fuller Plan.

2150/1278E


Edwin Adams
Cottage Street
Belmont Square
Street
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
66
67
68
69
75
76
77
78
79
80
81
87
88
89
90
91
92
93
100
200

HMM ASSOCIATES INC.

IGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal and Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: April '88

Type of Source Material:
[✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: Boston Public Library -

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: Issuing Authority:
(H&L)(D of P)(WPL)(DPW)(DEQE)

2. Licensee:

3. Date of Issuance: Scale:

4. Special Conditions: Y N Plan Available: Y N

5. Activity Authorized:

6. Historic/Current Shorelines:
HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES

7. Comments: (Special Conditions, Legislative Authorization, etc.)

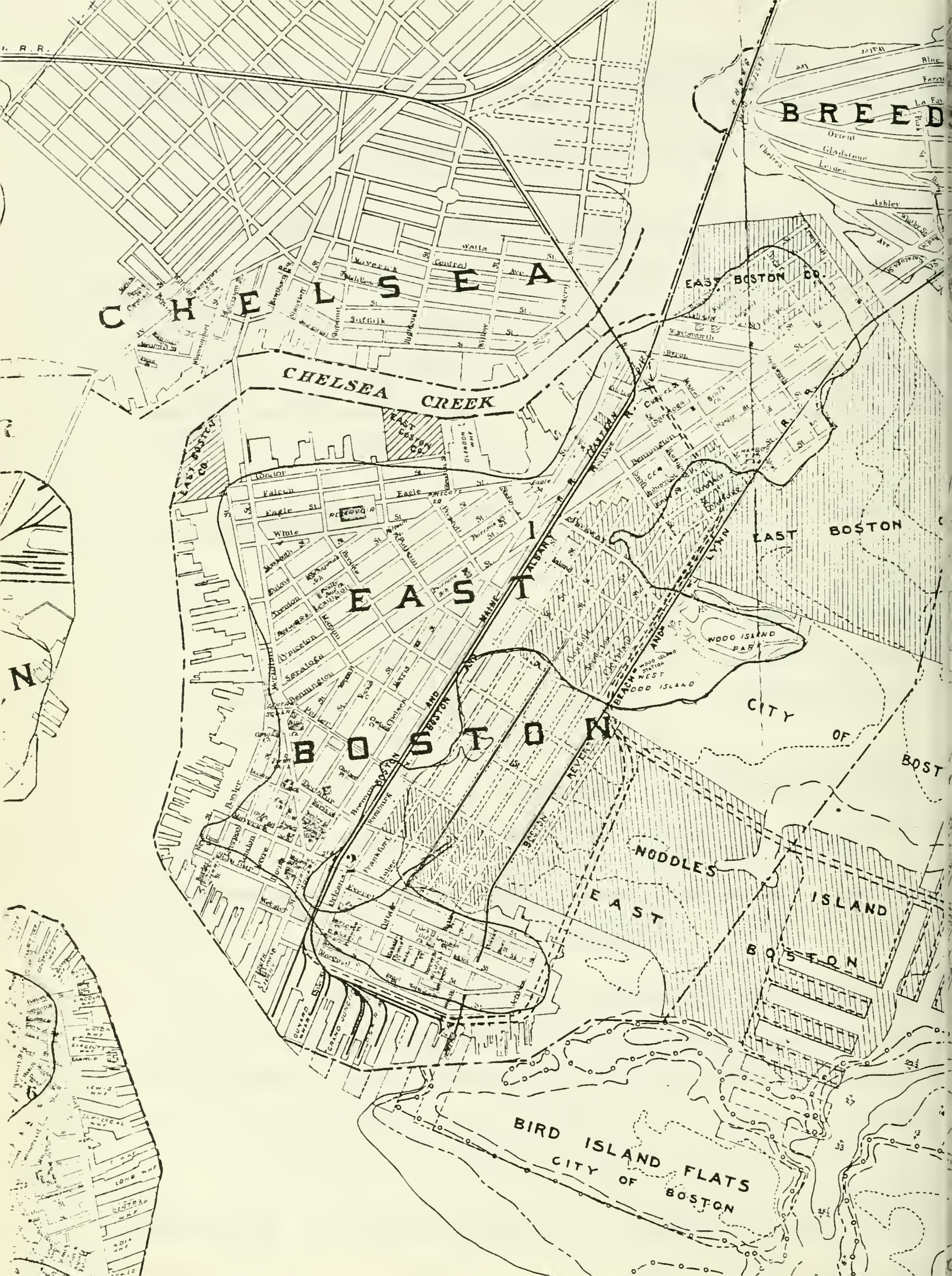
B. HISTORIC MAP/CHART

Reference: Conditions of Commercial Success Date: 1894

Site Location: East Boston Scale: no scale

Historic Shorelines: location of historic HWL Structures: roads, water depth contours

Comments: Pamphlet published by East Boston Company showing original Shoreline.
Section of map showing East Boston Piers 1-5 is attached


CHELSEA
CHELSEA CREEK
EAST BOSTON
BREED
EAST BOSTON CO.
EAST BOSTON CO.
GLENDON WHF
RESERVOIR
Maverick
Central
Walnut
Suffolk
Watts
Eagle
Falcon
White
Condor
Trenton
Lexington
Princeton
Saratoga
Bennington
Porter
Chelsea
Sumner
Maverick
Everett
Orleans
Marginal
Byron
Wordsworth
Orient
Gladstone
Leyden
Ashley
Moore
Chelsea
BOSTON AND MAINE R.R.
BOSTON REVERE BEACH AND LYNN R.R.
WOOD ISLAND PARK
WOOD ISLAND STATION
WEST WOOD ISLAND
EAST BOSTON
CITY OF BOSTON
NODDLES ISLAND
EAST BOSTON
ISLAND BOSTON
CUNARD WHF
GRAND JUNCTION
BIRD ISLAND FLATS
CITY OF BOSTON
LEWIS WHF
LONG WHF
CENTRAL WHF
INDIA WHF
N

HMM ASSOCIATES INC.

ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal & Park HMM Ref. No.: 1752-138

Researcher: Daniel J. Stuart Date: May 88

Type of Source Material: [✓ (Map)](License)(Plan)(Chart)(Text)

Location of Source Material: Bostonian Society

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: ______ Issuing Authority: ______ (H&L)(D of P)(WPL)(DPW)(DEQE)
2. Licensee: ______
3. Date of Issuance: ______ Scale: ______
4. Special Conditions: Y N Plan Available: Y N
5. Activity Authorized: ______
6. Historic/Current Shorelines: HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

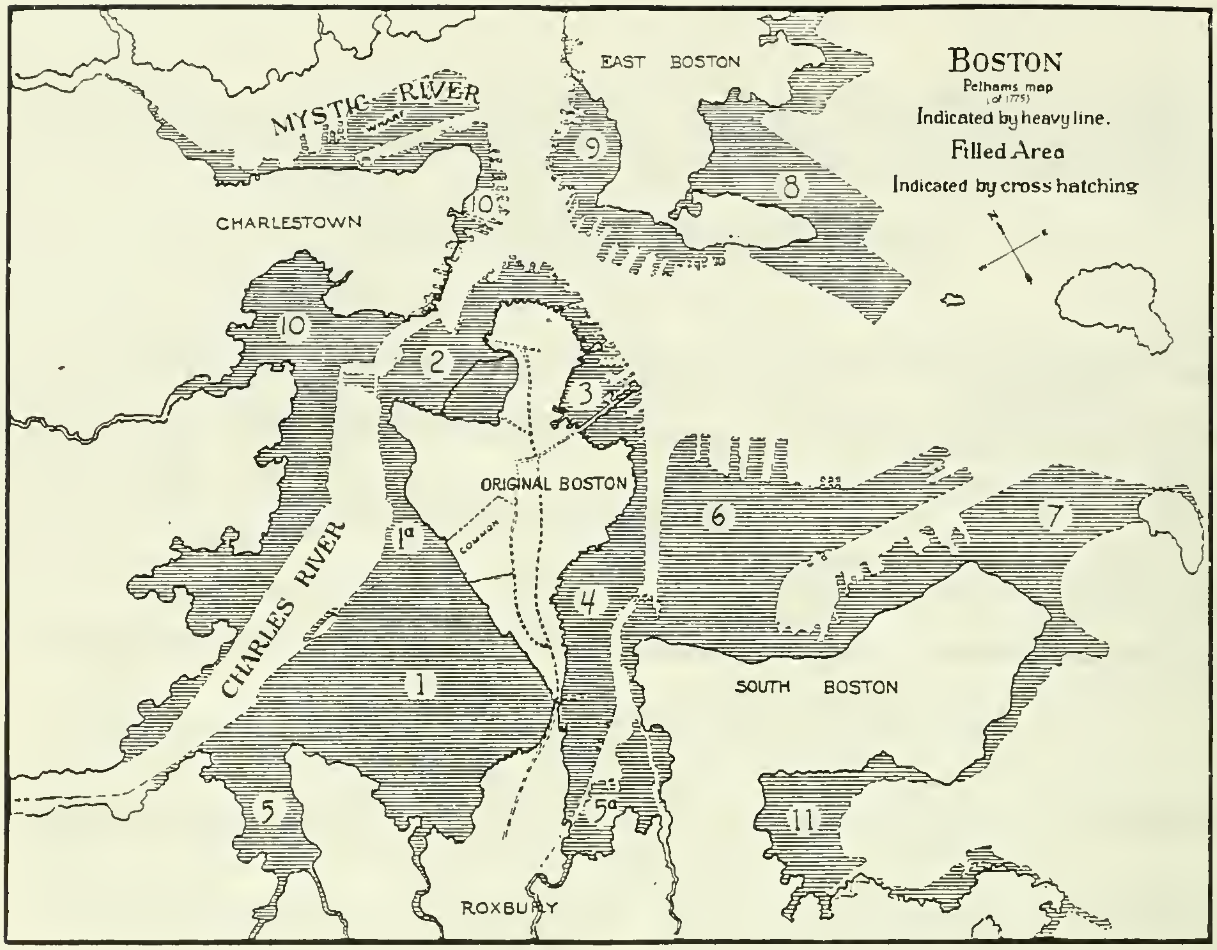
Reference: Boston, Pelhams Map Date: 1775

Site Location: Boston Harbor Scale: not to scale

Historic Shorelines: Shoreline of 1775 acording to Pelham Survey Structures: ______

Comments: Map shows filled in areas of Boston. A copy of the map and text is attached. Reprint from the annual proceedings of the Bostonian Society (1940).

2150/1278E



THE FILLED-IN AREAS OF BOSTON

Boston has greatly increased its area by filling bays, coves, and inlets. The original area is usually given as 783 acres. The filled-in lands add between three and four times that amount. Dates and amounts given below are approximate only as records do not agree, having been made at different times and by different men, and in certain localities filling-in is still in process. The figures are the best available and the numbered paragraphs refer to sections indicated on the accompanying map.

1. Back Bay, amount about 570 acres, mostly done after 1856 and continued to 1894.

1a. West Cove, amount about 80 acres, begun in 1803 and completed in 1863.

2. Mill Cove, amount about 70 acres, begun in 1804 and completed in 1835. Much of the filling north of the Causeway (indicated on the map by a line) was done in 1835.

3. Great or East Cove, amount about 112 acres, begun in 1823 and completed in 1874.

4. South Cove, amount about 86 acres, begun in 1806 and completed in 1843.

5. Roxbury, amount about 322 acres, the filling-in of which might be said to have started with that of the Back Bay as it was a continuation of it, becoming quite active in 1878 and completed in the 1890's, excepting that part bordering on the South Bay, which is in the section marked "5a".

5a. South Bay, amount about 138 acres, begun in 1850, not yet completed.

6. South Boston, amount about 714 acres, begun in 1836, still in process.

7. Marine Park, acquired in 1883, about 57 acres; bridge to Castle Island, July 1, 1891, included in South Boston filling.

8. Boston Air Port, authorized, May 12, 1922, about 150 acres in 1928, opened Sept. 8, 1923; part of the East Boston filling.

9. East Boston, amount about 370 acres, begun in 1880, not yet completed.

10. Charlestown, amount about 416 acres, begun 1860, completed to present state about 1896.

11. Columbus Park with Strandway, amount about 265 acres, acquired, 1890-1901; part of South Boston filling, as given above.

Much of the filling material for the Back Bay district came from Needham; the contractors, Goss and Munson, built six miles of railroad to facilitate transportation. The mill pond was filled from the cutting down of Sentry (Beacon) and Cotton (Pemberton) Hills. The West Cove was filled in part from the cutting down of West Hill (Mt. Vernon). Fort Hill contributed to the filling along Atlantic Avenue and to raising the grade of territory whose drainage had been impaired by the filling-in of the Back Bay. The dumping of city ashes and the dredging of the harbor also furnished material for various fillings.

HMM ASSOCIATES INC.
ENGINEERS, ENVIRONMENTAL CONSULTANTS & PLANNERS

TIDELANDS RESEARCH INFORMATION

Project: Massport Lobster Terminal and Park HMM Ref. No.: 1752-132

Researcher: Daniel J. Stuart Date: May '89

Type of Source Material: [✓ (Map)](License)(Plan)[✓ (Chart)](Text)

Location of Source Material: State Library of Massachusetts - Special Collections

A. CHAPTER 91 WATERWAYS LICENSES

1. License No.: Issuing Authority: (H&L)(D of P)(WPL)(DPW)(DEQE)
2. Licensee:
3. Date of Issuance: Scale:
4. Special Conditions: Y N Plan Available: Y N
5. Activity Authorized:
6. Historic/Current Shorelines:
   HHW HLW MHW MLW ELW HARBOR LINES PIER/BULK LINES
7. Comments: (Special Conditions, Legislative Authorization, etc.)

B. HISTORIC MAP/CHART

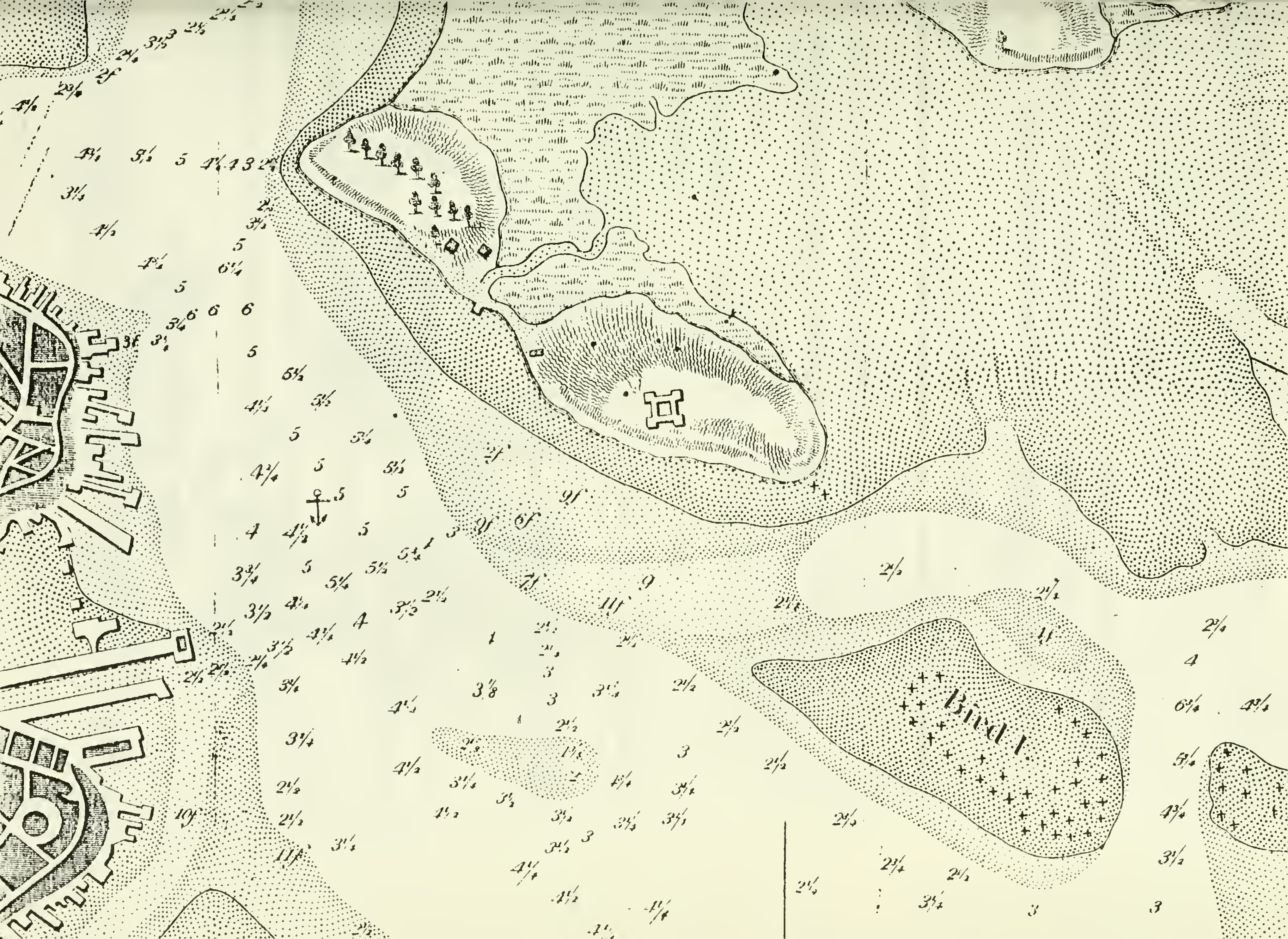
Reference: A. W Wadsworth, Surveyor Date: 1819

Site Location: Chart of Boston Harbor Scale: ~1" = 1500'

Historic Shorelines: Shoreline & flats of 1819 Structures: Streets and Forts

Comments: Attached is a exploded version with Noddles Island (East Boston) in the center Attached map is not to scale.

2150/1278E



Bird I.

APPENDIX E

SEDIMENT QUALITY DATA

TOXIKON
225 WILDWOOD STREET
WOBURN, MASSACHUSETTS 01801

CLIENT: HMM Associates
ADDRESS: 336 Baker Ave.
Concord, MA 01742
Attn: Lynn Gresock

TOXIKON: 88-06-013
P.O. #:
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

METHODOLOGIES:

1. Standard Methods for Examination of Water and Wastewater. APHA-AWWA-WACF. 16th Edition. 1985.
2. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. 1986.
3. Methods for Organic Chemical Analysis of Municipal; and Industrial Wastewater. EPA 600/4-82-057. 1982.
4. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-82-055. 1982.
5. Analysis of PCB's in Transformer Fluid and Waste Oil. EPA 600/4-81-045. 1981.
6. The United States Pharmacopeia. The National Formulary. USP 21st Edition. Formulary 15th Edition. 1985.
7. Sprayed Asbestos-Containing Materials in Buildings: A Guidance Document. EPA 450/2-78-014. 1978.

*MDL - Method Detection Limits (same units as the Results).

Authorized Personnel:

Laxman S. Desai, D.Sc.
Scientific Director

ENT: HMM Associates

LYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.1
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: A
IPLE LOCATION:
IPLE DESCRIPTION: Sediment
IPLE CONTAINER: Glass
LD PREP:

AMETER	RESULTS	UNITS	MDL*	INST.	DATE EXTRACT	DATE ANALYZE	REF**
al							
. Metals							
timony	ND	mg/Kg	30.0	ICP	06/21/88	06/29/88	2
senic	29	mg/Kg	20.0	ICP	06/21/88	06/29/88	2
ryllium	9.47	mg/Kg	0.400	ICP	06/21/88	06/29/88	2
dmium	3.7	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
romium	206	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
pper	1950	mg/Kg	0.800	ICP	06/21/88	06/29/88	2
ad	1710	mg/Kg	14.0	ICP	06/21/88	06/29/88	2
rcury	ND	mg/Kg	0.380	CV	06/21/88	06/23/88	2
ckel	597	mg/Kg	8.00	ICP	06/21/88	06/29/88	2
lenium	ND	mg/Kg	24.0	ICP	06/21/88	06/29/88	2
lver	9.70	mg/Kg	1.40	ICP	06/21/88	06/29/88	2
allium	ND	mg/Kg	60.0	ICP	06/21/88	06/29/88	2
inc	9170	mg/Kg	1.20	ICP	06/21/88	06/29/88	2
tal							
anide	ND	mg/Kg	0.71	Color.		06/30/88	2
lfide	1.6	mg/Kg	1.0	Color.		06/09/88	2

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.2
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: B
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	R
Total P.P. Metals							
Antimony	ND	mg/Kg	30.0	ICP	06/21/88	06/29/88	
Arsenic	102	mg/Kg	20.0	ICP	06/21/88	06/29/88	
Beryllium	0.6	mg/Kg	0.400	ICP	06/21/88	06/29/88	
Cadmium	8.2	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Chromium	384	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Copper	682	mg/Kg	0.800	ICP	06/21/88	06/29/88	
Lead	594	mg/Kg	14.0	ICP	06/21/88	06/29/88	
Mercury	0.82	mg/Kg	0.380	CV	06/21/88	06/23/88	
Nickel	106	mg/Kg	8.00	ICP	06/21/88	06/29/88	
Selenium	ND	mg/Kg	24.0	ICP	06/21/88	06/29/88	
Silver	27.0	mg/Kg	1.40	ICP	06/21/88	06/29/88	
Thallium	ND	mg/Kg	60.0	ICP	06/21/88	06/29/88	
Zinc	966	mg/Kg	1.20	ICP	06/21/88	06/29/88	
Total							
Cyanide	ND	mg/Kg	0.71	Color.		06/30/88	
Sulfide	1.6	mg/Kg	1.0	Color.		06/09/88	

ENT: HMM Associates

LYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.3
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: C
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
AMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	REF**
al							
. Metals							
timony	ND	mg/Kg	30.0	ICP	06/21/88	06/29/88	2
senic	42	mg/Kg	20.0	ICP	06/21/88	06/29/88	2
ryllium	0.80	mg/Kg	0.400	ICP	06/21/88	06/29/88	2
dmium	4.1	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
romium	154	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
pper	139	mg/Kg	0.800	ICP	06/21/88	06/29/88	2
ad	157	mg/Kg	14.0	ICP	06/21/88	06/29/88	2
rcury	0.49	mg/Kg	0.380	CV	06/21/88	06/23/88	2
ckel	47	mg/Kg	8.00	ICP	06/21/88	06/29/88	2
lenium	ND	mg/Kg	24.0	ICP	06/21/88	06/29/88	2
lver	12	mg/Kg	1.40	ICP	06/21/88	06/29/88	2
allium	ND	mg/Kg	60.0	ICP	06/21/88	06/29/88	2
nc	234	mg/Kg	1.20	ICP	06/21/88	06/29/88	2
al							
nide	ND	mg/Kg	0.71	Color.		06/30/88	2
fide	7.3	mg/Kg	1.0	Color.		06/09/88	2

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.4
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: D
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	F
Total P.P. Metals							
Antimony	ND	mg/Kg	30.0	ICP	06/21/88	06/29/88	
Arsenic	23	mg/Kg	20.0	ICP	06/21/88	06/29/88	
Beryllium	0.58	mg/Kg	0.400	ICP	06/21/88	06/29/88	
Cadmium	5.7	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Chromium	267	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Copper	309	mg/Kg	0.800	ICP	06/21/88	06/29/88	
Lead	282	mg/Kg	14.0	ICP	06/21/88	06/29/88	
Mercury	0.99	mg/Kg	0.380	CV	06/21/88	06/23/88	
Nickel	54	mg/Kg	8.00	ICP	06/21/88	06/29/88	
Selenium	ND	mg/Kg	24.0	ICP	06/21/88	06/29/88	
Silver	15.3	mg/Kg	1.40	ICP	06/21/88	06/29/88	
Thallium	ND	mg/Kg	60.0	ICP	06/21/88	06/29/88	
Zinc	411	mg/Kg	1.20	ICP	06/21/88	06/29/88	
Total Cyanide	ND	mg/Kg	0.71	Color.		06/30/88	
Sulfide	5.3	mg/Kg	1.0	Color.		06/09/88	

TIFICATE OF ANALYSIS

NT: HMM Associates

LYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.5
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

NT IDENT: E
LE LOCATION:
LE DESCRIPTION: Sediment
LE CONTAINER: Glass
D PREP:

					DATE		
METER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	REF**
al							
Metals							
imony	ND	mg/Kg	30.0	ICP	06/21/88	06/29/88	2
senic	27	mg/Kg	20.0	ICP	06/21/88	06/29/88	2
yllium	0.71	mg/Kg	0.400	ICP	06/21/88	06/29/88	2
mium	6.1	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
omium	353	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
per	293	mg/Kg	0.800	ICP	06/21/88	06/29/88	2
ad	278	mg/Kg	14.0	ICP	06/21/88	06/29/88	2
cury	0.90	mg/Kg	0.380	CV	06/21/88	06/23/88	2
kel	53	mg/Kg	8.00	ICP	06/21/88	06/29/88	2
lenium	ND	mg/Kg	24.0	ICP	06/21/88	06/29/88	2
lver	14	mg/Kg	1.40	ICP	06/21/88	06/29/88	2
allium	ND	mg/Kg	60.0	ICP	06/21/88	06/29/88	2
nc	434	mg/Kg	1.20	ICP	06/21/88	06/29/88	2
al							
nide	ND	mg/Kg	0.71	Color.		06/30/88	2
fide	ND	mg/Kg	1.0	Color.		06/09/88	2

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: Purgeable Organics 8240
TOXIKON: 88-06-013.1
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: A
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

				DATE OF		
PARAMETER	RESULTS	MDL*	INST.	EXTRACT	ANALYZE	R
Compounds	ug/Kg		GC/MS		06/10/88	
Chloromethane	-	2.0				
Bromomethane	-	2.0				
Vinyl Chloride	-	10.0				
Chloroethane	-	2.0				
Methylene Chloride	-	10.0				
Acetone	-	50.0				
Carbon Disulfide	-	2.0				
1,1-Dichloroethene	-	2.0				
1,1-Dichloroethane	-	2.0				
Trans-1,2-Dichloroethene	-	2.0				
Chloroform	-	2.0				
1,2-Dichloroethane	-	2.0				
2-Butanone	-	10.0				
1,1,1-Trichloroethane	-	2.0				
Carbon Tetrachloride	-	2.0				
Vinyl Acetate	-	2.0				
Bromodichloromethane	-	2.0				
1,2-Dichloropropane	-	2.0				
Trans-1,3-Dichloropropene	-	2.0				
Trichloroethene	-	2.0				
Dibromochloromethane	-	2.0				
1,1,2-Trichloroethane	-	2.0				
Benzene	-	2.0				
Cis-1,3-Dichloropropene	-	2.0				
2-Chloroethylvinyl Ether	-	2.0				
Bromoform	-	2.0				
2-Hexanone	-	4.0				
4-Methyl-2-Pentanone	-	4.0				
Tetrachloroethene	-	2.0				
1,1,2,2-Tetrachloroethane	-	2.0				
Toluene	-	2.0				
Chlorobenzene	-	2.0				
Ethylbenzene	-	2.0				
Styrene	-	2.0				
Total Xylenes	-	2.0				

"-" = Non-Detectable.

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: Purgeable Organics 8240

TOXIKON: 88-06-013.2
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: B
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

				DATE OF		
AMETER	RESULTS	MDL*	INST.	EXTRACT	ANALYZE	REF**
pounds	ug/Kg		GC/MS		06/10/88	3
oromethane	-	2.0				
momethane	-	2.0				
yl Chloride	-	10.0				
oroethane	-	2.0				
hylene Chloride	-	10.0				
tone	-	50.0				
bon Disulfide	-	2.0				
-Dichloroethene	-	2.0				
-Dichloroethane	-	2.0				
ns-1,2-Dichloroethene	-	2.0				
oroform	-	2.0				
-Dichloroethane	-	2.0				
utanone	-	10.0				
,1-Trichloroethane	-	2.0				
bon Tetrachloride	-	2.0				
yl Acetate	-	2.0				
modichloromethane	-	2.0				
-Dichloropropane	-	2.0				
ns-1,3-Dichloropropene	-	2.0				
chloroethene	-	2.0				
romochloromethane	-	2.0				
,2-Trichloroethane	-	2.0				
zene	-	2.0				
-1,3-Dichloropropene	-	2.0				
hloroethylvinyl Ether	-	2.0				
moform	-	2.0				
exanone	-	4.0				
ethyl-2-Pentanone	-	4.0				
rachloroethene	-	2.0				
,2,2-Tetrachloroethane	-	2.0				
uene	-	2.0				
orobenzene	-	2.0				
ylbenzene	-	2.0				
rene	-	2.0				
al Xylenes	-	2.0				

-" = Non-Detectable.

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: Purgeable Organics 8240

TOXIKON: 88-06-013.3
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: C
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

				DATE OF		
PARAMETER	RESULTS	MDL*	INST.	EXTRACT	ANALYZE	R
Compounds	ug/Kg		GC/MS		06/10/88	
Chloromethane	-	2.0				
Bromomethane	-	2.0				
Vinyl Chloride	-	10.0				
Chloroethane	-	2.0				
Methylene Chloride	-	10.0				
Acetone	-	50.0				
Carbon Disulfide	-	2.0				
1,1-Dichloroethene	-	2.0				
1,1-Dichloroethane	-	2.0				
Trans-1,2-Dichloroethene	-	2.0				
Chloroform	-	2.0				
1,2-Dichloroethane	-	2.0				
2-Butanone	-	10.0				
1,1,1-Trichloroethane	-	2.0				
Carbon Tetrachloride	-	2.0				
Vinyl Acetate	-	2.0				
Bromodichloromethane	-	2.0				
1,2-Dichloropropane	-	2.0				
Trans-1,3-Dichloropropene	-	2.0				
Trichloroethene	-	2.0				
Dibromochloromethane	-	2.0				
1,1,2-Trichloroethane	-	2.0				
Benzene	-	2.0				
Cis-1,3-Dichloropropene	-	2.0				
2-Chloroethylvinyl Ether	-	2.0				
Bromoform	-	2.0				
2-Hexanone	-	4.0				
4-Methyl-2-Pentanone	-	4.0				
Tetrachloroethene	-	2.0				
1,1,2,2-Tetrachloroethane	-	2.0				
Toluene	-	2.0				
Chlorobenzene	-	2.0				
Ethylbenzene	-	2.0				
Styrene	-	2.0				
Total Xylenes	-	2.0				

"-" = Non-Detectable.

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: Purgeable Organics 8240

TOXIKON: 88-06-013.4
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: D
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

AMETER	RESULTS	MDL*	INST.	DATE OF EXTRACT	DATE OF ANALYZE	REF**
pounds	ug/Kg		GC/MS		06/10/88	3
oromethane	-	2.0				
nomethane	-	2.0				
yl Chloride	-	10.0				
oroethane	-	2.0				
hylene Chloride	-	10.0				
tone	-	50.0				
bon Disulfide	-	2.0				
-Dichloroethene	-	2.0				
-Dichloroethane	-	2.0				
ns-1,2-Dichloroethene	-	2.0				
oroform	-	2.0				
-Dichloroethane	-	2.0				
utanone	-	10.0				
,1-Trichloroethane	-	2.0				
bon Tetrachloride	-	2.0				
yl Acetate	-	2.0				
modichloromethane	-	2.0				
-Dichloropropane	-	2.0				
ns-1,3-Dichloropropene	-	2.0				
chloroethene	-	2.0				
romochloromethane	-	2.0				
,2-Trichloroethane	-	2.0				
zene	-	2.0				
-1,3-Dichloropropene	-	2.0				
hloroethylvinyl Ether	-	2.0				
moform	-	2.0				
exanone	-	4.0				
ethyl-2-Pentanone	-	4.0				
rachloroethene	-	2.0				
,2,2-Tetrachloroethane	-	2.0				
uene	-	2.0				
orobenzene	-	2.0				
ylbenzene	-	2.0				
rene	-	2.0				
al Xylenes	-	2.0				

" = Non-Detectable.

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: Purgeable Organics 8240

TOXIKON: 88-06-013.5
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: E
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	RESULTS	MDL*	INST.	DATE OF EXTRACT	DATE OF ANALYZE	F
Compounds	ug/Kg		GC/MS		06/10/88	
Chloromethane	-	2.0				
Bromomethane	-	2.0				
Vinyl Chloride	-	10.0				
Chloroethane	-	2.0				
Methylene Chloride	-	10.0				
Acetone	-	50.0				
Carbon Disulfide	-	2.0				
1,1-Dichloroethene	-	2.0				
1,1-Dichloroethane	-	2.0				
Trans-1,2-Dichloroethene	-	2.0				
Chloroform	-	2.0				
1,2-Dichloroethane	-	2.0				
2-Butanone	-	10.0				
1,1,1-Trichloroethane	-	2.0				
Carbon Tetrachloride	-	2.0				
Vinyl Acetate	-	2.0				
Bromodichloromethane	-	2.0				
1,2-Dichloropropane	-	2.0				
Trans-1,3-Dichloropropene	-	2.0				
Trichloroethene	-	2.0				
Dibromochloromethane	-	2.0				
1,1,2-Trichloroethane	-	2.0				
Benzene	-	2.0				
Cis-1,3-Dichloropropene	-	2.0				
2-Chloroethylvinyl Ether	-	2.0				
Bromoform	-	2.0				
2-Hexanone	-	4.0				
4-Methyl-2-Pentanone	-	4.0				
Tetrachloroethene	-	2.0				
1,1,2,2-Tetrachloroethane	-	2.0				
Toluene	-	2.0				
Chlorobenzene	-	2.0				
Ethylbenzene	-	2.0				
Styrene	-	2.0				
Total Xylenes	-	2.0				

"-" = Non-Detectable.

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: BN Extractables 625

TOXIKON: 88-06-013.1
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: A
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
AMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
(2-Chloroethyl) ether		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
(2-Chloroisopropyl)ether		-	10.0	660.0			
itroso-Di-N-Propylamine		-	10.0	660.0			
achloroethane		-	10.0	660.0			
robenzene		-	10.0	660.0			
phorone		-	10.0	660.0			
(2-Chloroethoxy)methane		-	10.0	660.0			
,4-Trichlorobenzene		-	10.0	660.0			
hthalene		-	10.0	660.0			
achlorobutadiene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
hloronaphthalene		-	10.0	660.0			
ethyl phthalate		-	10.0	660.0			
naphthylene		-	10.0	660.0			
naphthene		-	10.0	660.0			
-Dinitrotoluene		-	20.0	660.0			
-Dinitrotoluene		-	10.0	660.0			
thylphthalate		-	10.0	660.0			
hlorophenyl phenyl ether		-	10.0	660.0			
orene		-	10.0	660.0			
itrosodiphenylamine		-	10.0	660.0			
romophenyl phenyl ether		-	10.0	660.0			
achlorobenzene		-	10.0	660.0			

" = Non-Detected.

CERTIFICATE OF ANALYSIS

CLIENT: HHM Associates

ANALYSIS REQUESTED: BN Extractables 625 (Continued)
TOXIKON: 88-06-013.1
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88
CLIENT IDENT: A
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	R
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sedimen ug/Kg	06/10/88	07/07/88	
Phenanthrene		-	50.0	660.0			
Anthracene		-	10.0	660.0			
Di-n-butylphthalate		-	10.0	660.0			
Fluoranthene		-	10.0	660.0			
Pyrene		-	10.0	660.0			
Butyl benzyl phthalate		-	20.0	660.0			
3,3'-Dichlorobenzidine		-	10.0	1300.0			
Benzo(a)anthracene		-	20.0	660.0			
bis(2-ethylhexyl)phthalate		-	10.0	660.0			
Chrysene		-	10.0	660.0			
Di-n-octyl phthalate		-	10.0	660.0			
Benzo(b)fluoranthene		-	10.0	660.0			
Benzo(k)fluoranthene		-	10.0	660.0			
Benzo(a)pyrene		-	50.0	660.0			
Indeno(1,2,3-cd)pyrene		-	10.0	660.0			
Dibenz(a,h)anthracene		-	10.0	660.0			
Benzo(g,h,i)perylene		-	50.0	660.0			

"-" = Non-Detected.

(1) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: Acid Extractables 625
TOXIKON: 88-06-013.1
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: A
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
AMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
ıol		-	10.0	660.0			
ılorophenol		-	10.0	660.0			
kyl Alcohol		-	20.0	1300.0			
ethylphenol		-	10.0	660.0			
ethylphenol		-	10.0	660.0			
itrophenol		-	10.0	660.0			
-Dimethylphenol		-	10.0	660.0			
zoic Acid		-	50.0	3300.0			
-Dichlorophenol		-	10.0	660.0			
ıloroaniline		-	20.0	1300.0			
ıloro-3-methylphenol		-	20.0	1300.0			
ethylnaphthalene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
,6-Trichlorophenol		-	10.0	660.0			
,5-Trichlorophenol		-	10.0	660.0			
itroaniline		-	50.0	3300.0			
itroaniline		-	50.0	3300.0			
-Dinitrophenol		-	10.0	3300.0			
itrophenol		-	10.0	3300.0			
enzofuran		-	10.0	660.0			
itroaniline		-	10.0	3300.0			
-Dinitro-2-methylphenol		-	10.0	3300.0			
ntachlorophenol		-	10.0	3300.0			

" = Non-Detected.

) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

CLIENT: HMM Associates

ANALYSIS REQUESTED: BN Extractables 625

TOXIKON: 88-06-013.2
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

CLIENT IDENT: B
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	F
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	
bis(2-Chloroethyl) ether		-	10.0	660.0			
1,3-Dichlorobenzene		-	10.0	660.0			
1,4-Dichlorobenzene		-	10.0	660.0			
1,2-Dichlorobenzene		-	10.0	660.0			
bis(2-Chloroisopropyl)ether		-	10.0	660.0			
N-Nitroso-Di-N-Propylamine		-	10.0	660.0			
Hexachloroethane		-	10.0	660.0			
Nitrobenzene		-	10.0	660.0			
Isophorone		-	10.0	660.0			
bis(2-Chloroethoxy)methane		-	10.0	660.0			
1,2,4-Trichlorobenzene		-	10.0	660.0			
Naphthalene		-	10.0	660.0			
Hexachlorobutadiene		-	10.0	660.0			
Hexachlorocyclopentadiene		-	10.0	660.0			
2-Chloronaphthalene		-	10.0	660.0			
Dimethyl phthalate		-	10.0	660.0			
Acenaphthylene		-	10.0	660.0			
Acenaphthene		-	10.0	660.0			
2,4-Dinitrotoluene		-	20.0	660.0			
2,6-Dinitrotoluene		-	10.0	660.0			
Diethylphthalate		-	10.0	660.0			
4-Chlorophenyl phenyl ether		-	10.0	660.0			
Fluorene		-	10.0	660.0			
N-Nitrosodiphenylamine		-	10.0	660.0			
4-Bromophenyl phenyl ether		-	10.0	660.0			
Hexachlorobenzene		-	10.0	660.0			

"-" = Non-Detected.

TIFICATE OF ANALYSIS

ENT: HHM Associates

LYSIS REQUESTED: BN Extractables 625
(Continued)
TOXIKON: 88-06-013.2
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88
ENT IDENT: B
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
D PREP:

METER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	REF**
ounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sedimen ug/Kg	06/10/88	07/07/88	3
anthrene		-	50.0	660.0			
racene		-	10.0	660.0			
-butylphthalate		-	10.0	660.0			
ranthene		-	10.0	660.0			
ne		-	10.0	660.0			
l benzyl phthalate		-	20.0	660.0			
-Dichlorobenzidine		-	10.0	1300.0			
zo(a)anthracene		-	20.0	660.0			
(2-ethylhexyl)phthalate		-	10.0	660.0			
sene		-	10.0	660.0			
-octyl phthalate		-	10.0	660.0			
zo(b)fluoranthene		-	10.0	660.0			
zo(k)fluoranthene		-	10.0	660.0			
zo(a)pyrene		-	50.0	660.0			
eno(1,2,3-cd)pyrene		-	10.0	660.0			
enz(a,h)anthracene		-	10.0	660.0			
zo(g,h,i)perylene		-	50.0	660.0			

" = Non-Detected.

) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: Acid Extractables 625

TOXIKON: 88-06-013.2
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

CLIENT IDENT: B
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	ANALYZE	R
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	
Phenol		-	10.0	660.0			
2-Chlorophenol		-	10.0	660.0			
Benxyl Alcohol		-	20.0	1300.0			
2-Methylphenol		-	10.0	660.0			
4-Methylphenol		-	10.0	660.0			
2-Nitrophenol		-	10.0	660.0			
2,4-Dimethylphenol		-	10.0	660.0			
Benzoic Acid		-	50.0	3300.0			
2,4-Dichlorophenol		-	10.0	660.0			
4-Chloroaniline		-	20.0	1300.0			
4-Chloro-3-methylphenol		-	20.0	1300.0			
2-Methylnaphthalene		-	10.0	660.0			
Hexachlorocyclopentadiene		-	10.0	660.0			
2,4,6-Trichlorophenol		-	10.0	660.0			
2,4,5-Trichlorophenol		-	10.0	660.0			
2-Nitroaniline		-	50.0	3300.0			
3-Nitroaniline		-	50.0	3300.0			
2,4-Dinitrophenol		-	10.0	3300.0			
4-Nitrophenol		-	10.0	3300.0			
Dibenzofuran		-	10.0	660.0			
4-Nitroaniline		-	10.0	3300.0			
4,6-Dinitro-2-methylphenol		-	10.0	3300.0			
Phentachlorophenol		-	10.0	3300.0			

"-" = Non-Detected.

(1) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: BN   Extractables 625

TOXIKON: 88-06-013.3
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: C
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

AMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
(2-Chloroethyl) ether		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
(2-Chloroisopropyl)ether		-	10.0	660.0			
itroso-Di-N-Propylamine		-	10.0	660.0			
achloroethane		-	10.0	660.0			
robenzene		-	10.0	660.0			
phorone		-	10.0	660.0			
(2-Chloroethoxy)methane		-	10.0	660.0			
,4-Trichlorobenzene		-	10.0	660.0			
hthalene		-	10.0	660.0			
achlorobutadiene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
hloronaphthalene		-	10.0	660.0			
ethyl phthalate		-	10.0	660.0			
naphthylene		-	10.0	660.0			
naphthene		-	10.0	660.0			
-Dinitrotoluene		-	20.0	660.0			
-Dinitrotoluene		-	10.0	660.0			
thylphthalate		-	10.0	660.0			
hlorophenyl phenyl ether		-	10.0	660.0			
orene		-	10.0	660.0			
itrosodiphenylamine		-	10.0	660.0			
romophenyl phenyl ether		-	10.0	660.0			
achlorobenzene		-	10.0	660.0			

" = Non-Detected.

CERTIFICATE OF ANALYSIS

CLIENT: HHM Associates

ANALYSIS REQUESTED: BN Extractables 625
(Continued)

TOXIKON: 88-06-013.3
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

CLIENT IDENT: C
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	R
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sedimen ug/Kg	06/10/88	07/07/88	
Phenanthrene		-	50.0	660.0			
Anthracene		-	10.0	660.0			
Di-n-butylphthalate		-	10.0	660.0			
Fluoranthene		-	10.0	660.0			
Pyrene		-	10.0	660.0			
Butyl benzyl phthalate		-	20.0	660.0			
3,3'-Dichlorobenzidine		-	10.0	1300.0			
Benzo(a)anthracene		-	20.0	660.0			
bis(2-ethylhexyl)phthalate		-	10.0	660.0			
Chrysene		-	10.0	660.0			
Di-n-octyl phthalate		-	10.0	660.0			
Benzo(b)fluoranthene		-	10.0	660.0			
Benzo(k)fluoranthene		-	10.0	660.0			
Benzo(a)pyrene		-	50.0	660.0			
Indeno(1,2,3-cd)pyrene		-	10.0	660.0			
Dibenz(a,h)anthracene		-	10.0	660.0			
Benzo(g,h,i)perylene		-	50.0	660.0			

"-" = Non-Detected.

(1) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

ENT: HMM Associates

LYSIS REQUESTED: Acid Extractables 625
TOXIKON: 88-06-013.3
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: C
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

AMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
nol		-	10.0	660.0			
nlorophenol		-	10.0	660.0			
xyl Alcohol		-	20.0	1300.0			
ethylphenol		-	10.0	660.0			
ethylphenol		-	10.0	660.0			
itrophenol		-	10.0	660.0			
-Dimethylphenol		-	10.0	660.0			
zoic Acid		-	50.0	3300.0			
-Dichlorophenol		-	10.0	660.0			
hloroaniline		-	20.0	1300.0			
hloro-3-methylphenol		-	20.0	1300.0			
ethylnaphthalene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
,6-Trichlorophenol		-	10.0	660.0			
,5-Trichlorophenol		-	10.0	660.0			
itroaniline		-	50.0	3300.0			
itroaniline		-	50.0	3300.0			
-Dinitrophenol		-	10.0	3300.0			
itrophenol		-	10.0	3300.0			
enzofuran		-	10.0	660.0			
itroaniline		-	10.0	3300.0			
-Dinitro-2-methylphenol		-	10.0	3300.0			
ntachlorophenol		-	10.0	3300.0			

" = Non-Detected.

) Other Matrices: MDL of medium-level soil & sludges by sonicator = MDL for Groundwater X 7.5

MDL of Non-water-miscible waste = MDL for Groundwater X 75

CLIENT: HMM Associates

ANALYSIS REQUESTED: BN Extractables 625

TOXIKON: 88-06-013.4
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

CLIENT IDENT: D
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE	
PARAMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88
bis(2-Chloroethyl) ether		-	10.0	660.0		
1,3-Dichlorobenzene		-	10.0	660.0		
1,4-Dichlorobenzene		-	10.0	660.0		
1,2-Dichlorobenzene		-	10.0	660.0		
bis(2-Chloroisopropyl)ether		-	10.0	660.0		
N-Nitroso-Di-N-Propylamine		-	10.0	660.0		
Hexachloroethane		-	10.0	660.0		
Nitrobenzene		-	10.0	660.0		
Isophorone		-	10.0	660.0		
bis(2-Chloroethoxy)methane		-	10.0	660.0		
1,2,4-Trichlorobenzene		-	10.0	660.0		
Naphthalene		-	10.0	660.0		
Hexachlorobutadiene		-	10.0	660.0		
Hexachlorocyclopentadiene		-	10.0	660.0		
2-Chloronaphthalene		-	10.0	660.0		
Dimethyl phthalate		-	10.0	660.0		
Acenaphthylene		-	10.0	660.0		
Acenaphthene		-	10.0	660.0		
2,4-Dinitrotoluene		-	20.0	660.0		
2,6-Dinitrotoluene		-	10.0	660.0		
Diethylphthalate		-	10.0	660.0		
4-Chlorophenyl phenyl ether		-	10.0	660.0		
Fluorene		-	10.0	660.0		
N-Nitrosodiphenylamine		-	10.0	660.0		
4-Bromophenyl phenyl ether		-	10.0	660.0		
Hexachlorobenzene		-	10.0	660.0		

"-" = Non-Detected.

TIFICATE OF ANALYSIS

ENT: HHM Associates

LYSIS REQUESTED: BN Extractables 625
(Continued)

TOXIKON: 88-06-013.4
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: D
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
AMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sedimen ug/Kg	06/10/88	07/07/88	3
nanthrene		-	50.0	660.0			
hracene		-	10.0	660.0			
n-butylphthalate		-	10.0	660.0			
oranthene		-	10.0	660.0			
ene		-	10.0	660.0			
yl benzyl phthalate		-	20.0	660.0			
'-Dichlorobenzidine		-	10.0	1300.0			
zo(a)anthracene		-	20.0	660.0			
(2-ethylhexyl)phthalate		-	10.0	660.0			
ysene		-	10.0	660.0			
n-octyl phthalate		-	10.0	660.0			
zo(b)fluoranthene		-	10.0	660.0			
zo(k)fluoranthene		-	10.0	660.0			
zo(a)pyrene		-	50.0	660.0			
eno(1,2,3-cd)pyrene		-	10.0	660.0			
enz(a,h)anthracene		-	10.0	660.0			
zo(g,h,i)perylene		-	50.0	660.0			

" = Non-Detected.

) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

CLIENT: HMM Associates

ANALYSIS REQUESTED: Acid Extractables 625

TOXIKON: 88-06-013.4
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

CLIENT IDENT: D
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

PARAMETER	INST.	RESULTS	MDL*(1)		DATE EXTRACT	DATE ANALYZE	R
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	
Phenol		-	10.0	660.0			
2-Chlorophenol		-	10.0	660.0			
Benxyl Alcohol		-	20.0	1300.0			
2-Methylphenol		-	10.0	660.0			
4-Methylphenol		-	10.0	660.0			
2-Nitrophenol		-	10.0	660.0			
2,4-Dimethylphenol		-	10.0	660.0			
Benzoic Acid		-	50.0	3300.0			
2,4-Dichlorophenol		-	10.0	660.0			
4-Chloroaniline		-	20.0	1300.0			
4-Chloro-3-methylphenol		-	20.0	1300.0			
2-Methylnaphthalene		-	10.0	660.0			
Hexachlorocyclopentadiene		-	10.0	660.0			
2,4,6-Trichlorophenol		-	10.0	660.0			
2,4,5-Trichlorophenol		-	10.0	660.0			
2-Nitroaniline		-	50.0	3300.0			
3-Nitroaniline		-	50.0	3300.0			
2,4-Dinitrophenol		-	10.0	3300.0			
4-Nitrophenol		-	10.0	3300.0			
Dibenzofuran		-	10.0	660.0			
4-Nitroaniline		-	10.0	3300.0			
4,6-Dinitro-2-methylphenol		-	10.0	3300.0			
Phentachlorophenol		-	10.0	3300.0			

"-" = Non-Detected.

(1) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: BN Extractables 625

TOXIKON: 88-06-013.5
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: E
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
AMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	REF**
pounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
(2-Chloroethyl) ether		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
-Dichlorobenzene		-	10.0	660.0			
(2-Chloroisopropyl)ether		-	10.0	660.0			
troso-Di-N-Propylamine		-	10.0	660.0			
achloroethane		-	10.0	660.0			
robenzene		-	10.0	660.0			
phorone		-	10.0	660.0			
(2-Chloroethoxy)methane		-	10.0	660.0			
4-Trichlorobenzene		-	10.0	660.0			
thalene		-	10.0	660.0			
achlorobutadiene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
loronaphthalene		-	10.0	660.0			
ethyl phthalate		-	10.0	660.0			
aphthylene		-	10.0	660.0			
aphthene		-	10.0	660.0			
-Dinitrotoluene		-	20.0	660.0			
-Dinitrotoluene		-	10.0	660.0			
hylphthalate		-	10.0	660.0			
lorophenyl phenyl ether		-	10.0	660.0			
orene		-	10.0	660.0			
itrosodiphenylamine		-	10.0	660.0			
romophenyl phenyl ether		-	10.0	660.0			
achlorobenzene		-	10.0	660.0			

" = Non-Detected.

CLIENT: HHM Associates

ANALYSIS REQUESTED: BN Extractables 625
(Continued)
TOXIKON: 88-06-013.5
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88
CLIENT IDENT: E
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	R
Compounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sedimen ug/Kg	06/10/88	07/07/88	
Phenanthrene		-	50.0	660.0			
Anthracene		-	10.0	660.0			
Di-n-butylphthalate		-	10.0	660.0			
Fluoranthene		-	10.0	660.0			
Pyrene		-	10.0	660.0			
Butyl benzyl phthalate		-	20.0	660.0			
3,3'-Dichlorobenzidine		-	10.0	1300.0			
Benzo(a)anthracene		-	20.0	660.0			
bis(2-ethylhexyl)phthalate		-	10.0	660.0			
Chrysene		-	10.0	660.0			
Di-n-octyl phthalate		-	10.0	660.0			
Benzo(b)fluoranthene		-	10.0	660.0			
Benzo(k)fluoranthene		-	10.0	660.0			
Benzo(a)pyrene		-	50.0	660.0			
Indeno(1,2,3-cd)pyrene		-	10.0	660.0			
Dibenz(a,h)anthracene		-	10.0	660.0			
Benzo(g,h,i)perylene		-	50.0	660.0			

"-" = Non-Detected.

(1) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: Acid Extractables 625

TOXIKON: 88-06-013.5
DATE RECEIVED: 06/03/88
DATE REPORTED: 06/29/88

ENT IDENT: E
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
METER	INST.	RESULTS	MDL*(1)		EXTRACT	ANALYZE	REF**
ounds	GC/MS	ug/Kg	Ground water ug/L	Soil/ Sediment ug/Kg	06/10/88	07/07/88	3
nol		-	10.0	660.0			
hlorophenol		-	10.0	660.0			
xyl Alcohol		-	20.0	1300.0			
ethylphenol		-	10.0	660.0			
ethylphenol		-	10.0	660.0			
itrophenol		-	10.0	660.0			
-Dimethylphenol		-	10.0	660.0			
zoic Acid		-	50.0	3300.0			
-Dichlorophenol		-	10.0	660.0			
hloroaniline		-	20.0	1300.0			
hloro-3-methylphenol		-	20.0	1300.0			
ethylnaphthalene		-	10.0	660.0			
achlorocyclopentadiene		-	10.0	660.0			
,6-Trichlorophenol		-	10.0	660.0			
,5-Trichlorophenol		-	10.0	660.0			
itroaniline		-	50.0	3300.0			
itroaniline		-	50.0	3300.0			
-Dinitrophenol		-	10.0	3300.0			
itrophenol		-	10.0	3300.0			
enzofuran		-	10.0	660.0			
itroaniline		-	10.0	3300.0			
-Dinitro-2-methylphenol		-	10.0	3300.0			
ntachlorophenol		-	10.0	3300.0			

" = Non-Detected.

) Other Matrices: MDL of medium-level soil & sludges by sonicator
= MDL for Groundwater X 7.5

MDL of Non-water-miscible waste
= MDL for Groundwater X 75

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.6
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: A BULK SEDIMENT
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	R
Total RCRA Metals							
Arsenic	28	mg/Kg	20.0	ICP	06/21/88	06/29/88	
Cadmium	4.5	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Chromium	221	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Copper	2,170	mg/Kg	0.800	ICP	06/21/88	06/29/88	
Lead	2,240	mg/Kg	14.0	ICP	06/21/88	06/29/88	
Mercury	ND	mg/Kg	0.380	CV	06/21/88	06/23/88	
Nickel	678	mg/Kg	8.00	ICP	06/21/88	06/29/88	
Zinc	10,900	mg/Kg	1.20	ICP	06/21/88	06/29/88	
Oil & Grease	19,000	mg/Kg	1.0	Grav.		07/01/88	
Volatile Solids	30,000	mg/Kg	1.0	Grav.		07/01/88	
Moisture	48	%				07/01/88	
PCB's	ND	mg/Kg	0.1	GC		07/07/88	

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.7
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: B BULK SEDIMENT
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

					DATE		
METER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	REF**
al							
Metals							
senic	40	mg/Kg	20.0	ICP	06/21/88	06/29/88	2
dmium	5.1	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
romium	264	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
pper	446	mg/Kg	0.800	ICP	06/21/88	06/29/88	2
ad	301	mg/Kg	14.0	ICP	06/21/88	06/29/88	2
rcury	0.97	mg/Kg	0.380	CV	06/21/88	06/23/88	2
kel	63	mg/Kg	8.00	ICP	06/21/88	06/29/88	2
nc	596	mg/Kg	1.20	ICP	06/21/88	06/29/88	2
& Grease	60,000	mg/Kg	1.0	Grav.		07/01/88	2
atile ids	40,000	mg/Kg	1.0	Grav.		07/01/88	2
sture	73	%				07/01/88	2
's	ND	mg/Kg	0.1	GC		07/07/88	3

CLIENT: HMM Associates

ANALYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.8
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: C BULK SEDIMENT /Comp 3/Gray
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	R
Total RCRA Metals							
Arsenic	ND	mg/Kg	20.0	ICP	06/21/88	06/29/88	
Cadmium	1.5	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Chromium	52.8	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Copper	39.6	mg/Kg	0.800	ICP	06/21/88	06/29/88	
Lead	40	mg/Kg	14.0	ICP	06/21/88	06/29/88	
Mercury	ND	mg/Kg	0.380	CV	06/21/88	06/23/88	
Nickel	26	mg/Kg	8.00	ICP	06/21/88	06/29/88	
Zinc	84.9	mg/Kg	1.20	ICP	06/21/88	06/29/88	
Oil & Grease	19,000	mg/Kg	1.0	Grav.		07/01/88	
Volatile Solids	20,000	mg/Kg	1.0	Grav.		07/01/88	
Moisture	47	%				07/01/88	
PCB's	ND	mg/Kg	0.1	GC		07/07/88	

TIFICATE OF ANALYSIS

ENT: HMM Associates

LYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.9
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

ENT IDENT: D BULK SEDIMENT
PLE LOCATION:
PLE DESCRIPTION: Sediment
PLE CONTAINER: Glass
LD PREP:

AMETER	RESULTS	UNITS	MDL*	INST.	DATE EXTRACT	ANALYZE	REF**
al A Metals							
senic	ND	mg/Kg	20.0	ICP	06/21/88	06/29/88	2
dmium	4.7	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
romium	238	mg/Kg	2.00	ICP	06/21/88	06/29/88	2
pper	268	mg/Kg	0.800	ICP	06/21/88	06/29/88	2
ad	235	mg/Kg	14.0	ICP	06/21/88	06/29/88	2
rcury	0.83	mg/Kg	0.380	CV	06/21/88	06/23/88	2
ckel	45	mg/Kg	8.00	ICP	06/21/88	06/29/88	2
nc	383	mg/Kg	1.20	ICP	06/21/88	06/29/88	2
& Grease	5,400	mg/Kg	1.0	Grav.		07/01/88	2
atile ids	30,000	mg/Kg	1.0	Grav.		07/01/88	2
sture	68	%				07/01/88	2
's	ND	mg/Kg	0.1	GC		07/07/88	3

CERTIFICATE OF ANALYSIS

CLIENT: HMM Associates

ANALYSIS REQUESTED: As listed below

TOXIKON: 88-06-013.10
DATE RECEIVED: 06/03/88
DATE REPORTED: 07/08/88

CLIENT IDENT: E BULK SEDIMENT
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sediment
SAMPLE CONTAINER: Glass
FIELD PREP:

					DATE		
PARAMETER	RESULTS	UNITS	MDL*	INST.	EXTRACT	ANALYZE	R
Total RCRA Metals							
Arsenic	ND	mg/Kg	20.0	ICP	06/21/88	06/29/88	
Cadmium	7.6	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Chromium	473	mg/Kg	2.00	ICP	06/21/88	06/29/88	
Copper	362	mg/Kg	0.800	ICP	06/21/88	06/29/88	
Lead	323	mg/Kg	14.0	ICP	06/21/88	06/29/88	
Mercury	1.13	mg/Kg	0.380	CV	06/21/88	06/23/88	
Nickel	63	mg/Kg	8.00	ICP	06/21/88	06/29/88	
Zinc	593	mg/Kg	1.20	ICP	06/21/88	06/29/88	
Oil & Grease	6,100	mg/Kg	1.0	Grav.		07/01/88	
Volatile Solids	30,000	mg/Kg	1.0	Grav.		07/01/88	
Moisture	61	%				07/01/88	
PCB's	ND	mg/Kg	0.1	GC		07/07/88	

APPENDIX F

BENTHIC ASSESSMENT DATA

REFERENCES

Battelle, New England Marine Research Laboratory (Batelle). 1983. Technical report on benthic communities at three stations adjacent to runways at Logan Airport. Report to Massachusetts Port Authority, Boston, MA.

Bergholz, E. and W.E. Robinson. 1983. Analysis of Benthic Communities at Three Sites Adjacent to Logan Airport Runways. Final Report to Massachusetts Port Authority, Boston, MA.

Department of the Interior, U.S. Fish and Wildlife Service (DOI). 1986. Endangered and Threatened Wildlife and Plants, January 1, 1986, 50 CFR 17.11 and 17.12. Washington, DC.

EG&G WASC Oceanographic Services (EG&G). 1984. Oceanographic Survey of Various Outfall Siting Options for the Deer Island Treatment Plant. Prepared for Havens & Emerson/Parsons Brinckerhoff, Boston, MA.

Gallagher, Eugene D. 1988. Personal Communication. June 7, 1988. Environmental Sciences Program, University of Massachusetts, Boston, MA.

Grassle, J.P. and J.F. Grassle. 1974. Opportunistic Life Histories and Genetic Systems in Marine Benthic Polychaetes. Journal of Marine Research 32:253–284.

Grassle, J.P. and J.F. Grassle. 1976. Sibling Species in the Marine Pollution Indicator Capitella (Polychaeta). Science 192:567–569.

Grassle, J.P. 1988. Personal Communication. June 9, 1988. Marine Biological Laboratory, Woods Hole, MA.

Gray, J.S. 1974. Animal–Sediment Relationships. Oceanogr. Mar. Biol. An. Rev. 12: 233–261.

Halterman, S. 1988. Personal Communication. June 8, 1988. Technical Services Branch, Division of Water Pollution Control, Massachusetts Department of Environmental Quality Engineering, Westborough, MA.

James, C.J. and R. Gibson. 1980. The Distribution of the Polychaete Capitella Capitata in Dock Sediments. Estuarine and Coastal Marine Science, 10:671–683.

Marine Environmental Services (MES). 1977a. Ecological Field Survey in the Mystic River. Prepared for Stone and Webster Engineering Corporation, Hanover, NH.

Marine Environmental Services (MES). 1977b. Ecological Field Survey in the Mystic River. prepared for Stone and Webster Engineering Corporation, Hanover, NH.

Massachusetts, Commonwealth of, Division of Fisheries and Wildlife, Natural Heritage Program (NHP). 1988. List of Endangered, Threatened and Special Concern Animals of Massachusetts. Boston, MA.

Michael, A.D. 1988. Personal Communication. June 7, 1988. Technical Resources, Inc., Rockville, MD.

Michael, A.D., C. Van Raalte, and L.S. Brown. 1975. Long-Term Effects of an Oil Spill at West Falmouth. In: Proc, API-EPA Conf. Prevention and Control of Oil Pollution, San Francisco, 1975. American Petroleum Institute, Washington, DC.

New England Research, Inc. (NER). June, 1980. Metropolitan District Commission Boston Combined Sewer Overflow Program, Vol. II. Draft Environmental Assessment Report. Prepared for O'Brien and Gere Engineers, Inc., Boston, MA.

Stewart, R.K. January, 1968. Biological Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts, July - August, 1967. Federal Water Pollution Control Administration, Cincinnati, OH.

U.S. Army Corps of Engineers (COE), Impact Analysis Branch. 1987. Draft Environmental Assessment of the Proposed Boston Harbor Improvement Dredging Project in Boston, Massachusetts. Environment Resources Section, Waltham, MA.

ADDITIONAL REFERENCES

Appy, T. D., L. E. Linkletter, and M. J. Dadswell. 1980. A Guide to the Marine Flora and Fauna of the Bay of Fundy : Annelida : Polychaeta. Fisheries and Environmental Sciences, Department of Fisheries and Oceans, St. Andrews, New Brunswick, Canada.

Blake, J. A. 1971. Revision of the Genus Polydora from the East Coast of North America (Polychaeta : Spionidae). Smithson. Contrib. Zool. 75.

Bousfield, E. L. 1973. Shallow-Water Gammaridean Amphipoda of New England. Comstock Publishing Associates, Ithaca, NY.

Gosner, K. L. 1979. A Field Guide to the Atlantic Seashore, Invertebrates and Seaweeds of the Atlantic Coast from the Bay of Fundy to Cape Hatteras. Houghton Mifflin Company, Boston, MA.

Pettibone, M. H. 1963. Marine Polychaeta Worms of the New England Region. 1. Aphroditidae through Trochochaetidae. Bull. U. S. Nat. Mus. 227:1-356.

Smith, R. I. 1964. Keys to Marine Invertebrates of the Woods Hole Region. Contr. No. 11. Systematics - Ecology Program. Marine Biological Laboratory, Woods Hole, MA.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 1
DATE COLLECTED: 6/2/88 - 8:30 Am
DATE SORTED: presorted 6/20 - 6/22/88
sorted 7/10/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Capitella spp.	𝍸 |	(131)
Eteone longa	|	(1)
Oligochaeta	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||||	(64)
Polydora sp.	𝍸	(5)
Modiolus modiolus juv.	𝍸	(5)
Mya arenaria	|	(1)
Capitellidae	𝍸 𝍸 𝍸 𝍸 𝍸 |||	(28)

Field Notes: Sediment is black mud with H_2S odor. Oily sheen on sediment. Wood fragments, leaves, Mya, mytilus edulis, Crepidula and Balanus fragments and empty shells. Some polychaetes observed.

ADDITIONAL NOTES:
Sample debris had wood fragments, solder pieces, tar chunks, dead hydroid stalks, paper, plastic fragments, leaves, Coal and metal bits, Balanus fragments, Mytilus shells.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 2
DATE COLLECTED: 6/2/88 - 8:40 Am
DATE SORTED: 7/13 - 7/14/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |||
Capitellidae	𝍸 𝍸 𝍸 |
Polydora sp.	𝍸 𝍸 𝍸 𝍸 ||||
Spionidae	|||
Nereis arenaceodonta	𝍸 |||
Harmothoe imbricata	||
Oligochaeta	𝍸 𝍸
Mya arenaria juv.	| (1)

Field Notes: Lots of shell debris, some leaves, tar fragments, polychaete tubes. Live Carcinus maenus female bearing eggs on top of sample. Oily sheen on sediment. Live polychaetes

ADDITIONAL NOTES: Leaf and wood fragments. Coal pieces. Barnacle fragments. Hydroid stalks. Littorina littorea shells. Juveni Mya arenana shells. Crepidula shell. Nail, feather. Lots of small stones.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #3
DATE COLLECTED: 6/2/88 11:00 Am
DATE SORTED: sorted 7/16/88 - 7/17/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Mya arenaria juv.	|||	(3)
Modiolus modiolus juv	𝍸 𝍸	(10)
Corophium sp.	𝍸 𝍸	(12
Insect larvae	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |||	(7
Fabricia sabella	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |	(4
Oligochaeta	𝍸 𝍸 𝍸 𝍸 ||	(2
Polydora sp.	𝍸 ||	(14
Capitellidae	||||	(4)
Capitella spp.	𝍸 𝍸 𝍸 ||||	(19)

Field Notes: Sandy sediment with several sizes of stones. Green algae, amphipod crustaceans, live *Littorina littorea* and polychaete worm tubes.

ADDITIONAL NOTES: Green algae, *Littorina littorea* shell, sand grains, masses of empty tubes. Mats of tubes, *Polydora* sp. in tube.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #4
DATE COLLECTED: 6/2/88 - 9:00 Am
DATE SORTED: presorted 7/5/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Microdentopus sp.	𝍷
Modiolus modiolus juv.	𝍷𝍷
Mya arenaria juv.	𝍷
Tunicata	
Spionidae	𝍷𝍷𝍷
Harmothoe imbricata	𝍷𝍷𝍷𝍷
Polydora sp.	
Capitellidae	𝍸𝍸 𝍷𝍷
Capitella spp.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍷𝍷𝍷𝍷
Oligochaeta	𝍸 𝍸

Field Notes: Sandy coarse sediment and shell fragments. *Mytilus edu*
Balanus, *Mya* fragments and *Littorina littorea* shell
Tunicates noted. Polychaetes noted - red color.

ADDITIONAL NOTES: Shell fragments. Tar and coal fragments.
Modiolus modiolus juvenile shells.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 5
DATE COLLECTED: 6/2/88 - 9:30 Am
DATE SORTED: 7/6/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Capitella spp.	𝍸 II	(7)
Oligochaeta	IIII	(4)

Field Notes: Mud sediment with H_2S odor. Oily sheen on sediment. Insect wings. Coarse debris, plastic bag, tar fragments, wood debris, fine leaf debris. *Mytilus* shell fragments. Not much noted in the way of living organisms.

ADDITIONAL NOTES: Lots of empty worm tubes, wood fragments, coal bits, and insect wings.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #6
DATE COLLECTED: 6/2/88 - 9:50 Am
DATE SORTED: 7/5/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Oligochaeta	1

Field Notes: Black mud, H_2S odor, oily sheen on sediment. Felt ill due
odor of sediment - stronger than sample #5. Lots of debris
Wood fragments, Mytilus fragments, Carcinus shell, Crepidul
shells. Didn't observe anything living.

ADDITIONAL NOTES:

Lots of empty tubes.
Bits of charred wood
Hydroid stalks.
Some empty Gastropod shells.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 7
DATE COLLECTED: 6/2/88 - 10:10 Am
DATE SORTED: 6/17/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Capitella spp.	III	(3)
Modiolus modiolus juvenile	I	(1)

Field Notes: Sample taken off the "Boston Patriot" Barge tied up beside Pier 5. Black mud with oily sheen and H_2S odor. Some debris – *Crepidula* shells, crab claw, shell fragments, and wood fragments. Leaf debris and dead (?) Coralline algae. One polychaete noted.

ADDITIONAL NOTES:
hydroid stalks, coal debris, wood fragments, lots of tubes of some sort (?), fish scales, very small *Modiolus modiolus* shells, clam and snail shells.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #8
DATE COLLECTED: 6/2/88 - 10:25Am
DATE SORTED: 7/8/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
2 polychaete fragments	

Field Notes: Black mud with oily sheen and H_2S odor. Wood fragmen, *Mytilus* shells, *Crepidula* shells. Did not note any living organisms. Barnacle fragments. *Anomia* shell.

ADDITIONAL NOTES: Masses of hydroids - stalks. Barnacle fragments. Polychaete tubes, wood fragments and coal fragments. Fish bone. *Anomia* shell.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #9
DATE COLLECTED: 6/2/88 - 11:40 Am
DATE SORTED: 7/6/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp. (large specimens)	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 ||| (33)

Field Notes: Lots of jellyfish in the water column. (*Aurelia* ?). Black mud - lots of very small pellets. Leaf matter, paint chips debris. A few polychates noted (red ones) and some small jellyfish. Not as much oily sheen noted on the sediment as in other samples.

ADDITIONAL NOTES: Masses of hydroid stalks, coal and paint fragments, *Mytilus* shell, wood fragments, and rope fibers.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #10
DATE COLLECTED: 6/2/88 - 2:15 Pm
DATE SORTED: 7/7/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
None	

Field Notes: Gray - clay sediment. Hard to get grab sample. No odor. No organisms noted. Thick, hard clay.

ADDITIONAL NOTES: Many clay clumps.
Polychaete tube.
Coal fragments.
Mytilus edulis shell.
Hydroid stalk.
Brick fragment.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #11
DATE COLLECTED: 6/2/88 - 1:45 Pm
DATE SORTED: 7/8/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp.	𝍸 𝍸 𝍸 𝍸 (20)

Field Notes: Mud. Debris. Polychaetes evident (red ones).

ADDITIONAL NOTES: Numerous seed pods.
Wood fragments.
Lots of coal fragments.
Pieces of cloth and plastic.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 12
DATE COLLECTED: 6/2/88 - 1:25Pm
DATE SORTED: 7/7/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp. very large specimens.	𝍸 𝍸 𝍸 𝍸 𝍷 (21)

Field Notes: Mud, H_2S odor, a little oily sheen on the sediment. Several pieces of coal. *Mytilus* shell fragments. Polychates obvious.

ADDITIONAL NOTES: Juvenile razor clam shell.
Lots of seed pods.
Lots of coal fragments.
Rubber pieces.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 13
DATE COLLECTED: 6/2/88 - 1:02 Pm
DATE SORTED: 6/3/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp.	卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 (50) one individual 5 cm long one individual 6 cm long

Field Notes: Mud. Some clay - difficult to sieve. A little oily sheen on the sediment. Worm tubes and polychaete worms noted.

ADDITIONAL NOTES: numerous seed pods, small bits of coal debris (lots), wood fragments, gastropoda shell

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: # 14
DATE COLLECTED: 6/2/88 - 12:45 Pm
DATE SORTED: 6/17/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Capitella spp.	1	(1)

Field Notes : Mud, H_2S odor, and a little bit of oily sheen. Only one worm noted. Fish bones (?) and seed pods (?) evident.

ADDITIONAL NOTES: hydroid debris
seed pods
fish bones

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #15
DATE COLLECTED: 6/2/88 - 12:30 Pm
DATE SORTED: 7/7/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 || (47)

Field Notes: Mud, H_2S odor, not much of an oily sheen. Rocks, *Crepidula* shells, and some polychaetes noted.

ADDITIONAL NOTES: Brick fragments.
Plastic.
Coal and wood fragments.
Littorina littorea shell.
metal fragments.
Crepidula shell.
gastropoda shell.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #16
DATE COLLECTED: 6/2/88 - 3:00 Pm
DATE SORTED: 7/8/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN	
Capitella spp.	𝍸 𝍸 ||||	(14)

Field Notes: Gray-black mud with some clay. No H_2S odor. Some red polychaetes noted.

ADDITIONAL NOTES: Tooth pick.
Clay pieces.
Wood and leaf fragments.
Fish bones
Hydroid stalks.
Fishing line.

MASSPORT LOBSTER TERMINAL & PARK
EAST BOSTON

SORTING SHEET

SAMPLE NUMBER: #17
DATE COLLECTED: 6/2/88 – 2:35 pm
DATE SORTED: 7/8/88

TYPE OF SPECIMEN	NUMBERS OF SPECIMEN
Capitella spp.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 (35)

Field Notes: Gray-black mud, no H_2S odor. Polychaetes noted, *Mytilus* fragments, wood and shell debris. Sediment with some clay and loaded with fish bones.

ADDITIONAL NOTES: Wood fragments.
Mytilus shells.
Coal fragments.

APPENDIX G

TRAFFIC DATA

APPENDIX G-1

PHYSICAL AND OPERATIONAL CHARACTERISTICS OF KEY STUDY AREA INTERSECTIONS

APPENDIX G-1
PHYSICAL AND OPERATIONAL CHARACTERISTICS OF KEY STUDY AREA INTERSECTIONS

Chelsea Street at Porter Street is a signalized intersection. Chelsea Street is a two-lane, two-way facility with parking permitted along both approaches. The total pavement width along Chelsea Street is approximately 40 feet. Porter Street is approximately 30 feet wide and is one-way eastbound at this location.

Porter Street at Orleans Street forms a standard four-way intersection. Traffic at this location is controlled by an actuated signal. Orleans Street provides for two lanes of bi-directional traffic and has parking on both sides. North of Porter Street is the driveway to the East Boston Stadium and the MBTA station. South of Porter Street, Orleans Street is 36 feet wide. Porter Street is 34 feet wide and provides for two lanes of traffic (one in each direction). East of Orleans Street there is parking on both sides of this facility.

Sumner Street at Maverick Square forms the southern portion of Maverick Square. The traffic configuration is somewhat out of the ordinary in that traffic flows clockwise around this Square (instead of the conventional counterclockwise). The traffic flow pattern has been instituted to better accommodate bus loading/off loading operations by positioning bus doors on the transit station island.

Chelsea Street is 33 feet wide, and traffic flows southbound with parking allowed on one side of this facility. Meridian Street is one-way northbound with a pavement width of 32 feet. There is also parking on one side of this street. Sumner Street provides for two lanes of travel (one in each direction). Each lane is 29 feet wide, and parking is allowed on both sides of the street, except between Chelsea and Meridian Streets.

Porter Street at Bremen Street forms a five-way segment which includes a connector roadway to Visconti Way. Porter Street west of Bremen is approximately 34 feet wide and is one-way eastbound, while Porter Street east of the intersection provides for bi-directional traffic flow. Bremen Street provides for two directional traffic flow and is approximately 25 feet wide.

Maverick Street at Maverick Square forms the northern portion of Maverick Square. The clockwise flow around the square occurs here as well as at Sumner Street. Chelsea Street is approximately 35 feet wide and is one-way southbound, while Meridian Street is, to the south of Maverick Street, one-way northbound and is also approximately 35 feet wide. Meridian Street north of Maverick Square provides two-lane, bi-directional flow. Maverick Street is one-way westbound and Chelsea Street north of the Square is two-way. Traffic at this location is partially controlled by stop signs with certain movements seemingly operating on a first come, first served basis.

Maverick Street at Orleans Street is a stop sign controlled intersection with the stop sign along the Orleans Street approach. Maverick Street is one-way westbound, with a pavement width of approximately 34 feet. Vehicles park along both sides of Maverick Street, leaving one wide travel lane for through, right and left-turning vehicles. Orleans Street is a two-lane, two-way travel way, with parking along both sides. The travel way is approximately 34 feet wide.

Cottage Street at Maverick Street is a stop sign controlled intersection with only two approach roadways. Cottage Street is one-way southbound, with approximately 30 feet of pavement. Parking is permitted along both sides of Cottage Street. Maverick Street is one-way westbound, and is approximately 34 feet wide at this location. Parking is also permitted along both sides of Maverick Street.

Sumner Street at Bremen Street is stop sign controlled with stop signs along the two Bremen Street approaches. The Sumner Street eastbound approach at this location is approximately 21 feet wide, with parking; the Sumner Street westbound approach is approximately 24 feet wide, with parking. The pavement width along Bremen Street varies from approximately 32 feet, north of Sumner Street, to 46 feet, south of Sumner Street, with parking on both sides. Only one travel lane is provided for each approach at this intersection.

Sumner Street at Orleans Street is also stop sign controlled, with stop signs along the Orleans Street approaches. Orleans Street provides two lanes of travel, one in each direction, with approach widths of approximately 15 feet. Parking is permitted along both sides of Orleans Street. Sumner Street west of Orleans Street is a two-lane, two-way facility. East of Orleans Street, Sumner Street is one-way eastbound (out of the intersection). The Sumner Street eastbound approach at this location is approximately 22 feet, with parking.

Cottage Street at Sumner Street has only two approaches, since Sumner Street at this location is one-way eastbound and Cottage Street is one-way southbound. A single stop sign controls traffic along the Cottage Street southbound approach, which is approximately 25 feet wide, with parking on both sides. Sumner Street is approximately 32 feet wide, with parking on both sides.

APPENDIX G–2

TABLE G.2-1
1988 EXISTING PEAK HOUR INTERSECTION OPERATION SUMMARY

SIGNALIZED INTERSECTIONS

Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Average Delay (sec)	PM Peak Hour LOS	PM Peak Hour Average Delay (sec)
1) Chelsea Street @ Porter Street	EB	B	10.8	C	20.1
	NB	B	13.6	B	15.0
	SB	B	13.9	C	16.0
	OVERALL	B	11.9	C	17.9
2) Porter Street @ Orleans Street	EB	B	5.3	B	5.8
	WB	A	5.0	B	5.1
	NB	B	10.4	B	10.8
	SB	B	10.0	B	9.9
	OVERALL	B	6.6	B	7.0
3A) Sumner Street @ Maverick Square (Meridian Street)	EB	B	13.6	B	13.7
	WB	C	18.1	C	16.8
	OVERALL	C	16.4	C	15.5
3B) Sumner Street @ Maverick Square (Chelsea Street)	EB	B	11.9	B	12.0
	WB	B	12.1	B	11.8
	SB	B	11.0	B	12.0
	OVERALL	B	11.4	B	11.9

– Continued –

TABLE G.2-1 (Continued)

UNSIGNALIZED INTERSECTIONS

	Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Reserve Capacity	PM Peak Hour LOS	PM Peak Hour Reserve Capacity
4)	Bremen Street @ Porter Street	EB L	A	1,068	A	1,013
		WB L	A	1,050	A	946
		NB	A	664	A	441
		SB	A	465	B	302
5A)	Maverick Street @ Maverick Square (Meridian Street)	NB	A	615	A	559
		SB	C	307	C	225
5B)	Maverick Street @ Maverick Square (Chelsea Street)	EB L	A	790	A	719
		WB L	A	890	A	822
		SB	B	354	D	168
6)	Maverick Street @ Orleans Street	WB L	A	1,165	A	1,158
		NB	A	520	A	502
		SB	A	682	A	673
7)	Maverick Street @ Cottage Street	WB L	A	1,171	A	1,166
		NB	A	1,083	A	1,083
		SB	A	685	A	599
8)	Sumner Street @ Bremen Street	EB L	A	1,044	A	1,079
		WB L	A	919	A	840
		NB	A	538	A	512
		SB	A	532	B	381
9)	Sumner Street @ Orleans Street	EB L	A	1,136	A	1,110
		NB	A	585	A	456
		SB	A	645	A	643
10)	Sumner Street @ Cottage Street	NB	A	860	A	743
		SB	A	681	A	562

TABLE G.2-2
1992 NO-BUILD AND 1992 BUILD ALTERNATIVES
INTERSECTION OPERATIONS SUMMARY - AM PEAK HOUR

SIGNALIZED INTERSECTIONS

	Intersection	Movement	No-Build LOS	No-Build Average Delay (sec)	Build LOS	Build Average Delay (sec)
1)	Chelsea Street	EB	B	13.1	B	13.8
	@ Porter Street	NB	B	14.0	B	14.0
		SB	B	13.2	B	13.3
		OVERALL	B	13.3	B	13.7
2)	Porter Street	EB	B	5.7	B	5.9
	@ Orleans Street	WB	B	5.1	B	5.1
		NB	B	10.8	B	10.8
		SB	B	10.0	B	10.0
		OVERALL	B	7.0	B	7.0
3A)	Sumner Street	EB	C	16.4	C	16.4
	@ Maverick Square	WB	C	23.2	C	23.4
	(Meridian Street)					
		OVERALL	C	20.6	C	20.7
3B)	Sumner Street	EB	B	12.0	B	12.0
	@ Maverick Square	WB	B	12.2	B	12.2
	(Chelsea Street)	SB	B	12.2	B	12.8
		OVERALL	B	12.1	B	12.5

- Continued -

TABLE G.2–2 (Continued)

UNSIGNALIZED INTERSECTIONS

	Intersection	Movement	No–Build		Build	
			LOS	Reserve Capacity	LOS	Reserve Capacity
4)	Bremen Street @ Porter Street	EB L	A	1039	A	1039
		WB L	A	980	A	975
		NB	A	604	A	592
		SB	B	362	B	347
5A)	Maverick Street @ Maverick Square (Meridian Street)	NB	A	419	A	416
		SB	E	55	E	48
5B)	Maverick Street @ Maverick Square (Chelsea Street)	EB L	A	738	A	736
		WB L	A	823	A	808
		SB	C	222	D	197
6)	Maverick Street @ Orleans Street	WB L	A	1,163	A	1,163
		NB	A	423	C	403
		SB	A	594	A	575
7)	Maverick Street @ Cottage Street			– NOT IMPACTED –		
8)	Sumner Street @ Bremen Street	EB L	A	1,026	A	1,025
		WB L	A	831	A	806
		NB	B	396	B	376
		SB	B	381	B	353
9)	Sumner Street @ Orleans Street	EB L	A	1,132	A	1,132
		NB	A	451	A	420
		SB	A	555	A	528
10)	Sumner Street @ Cottage Street			– NOT IMPACTED –		

TABLE G.2-3
1992 NO-BUILD AND 1992 BUILD ALTERNATIVES
INTERSECTION OPERATIONS SUMMARY - PM PEAK HOUR

SIGNALIZED INTERSECTIONS

	Intersection	Movement	No-Build LOS	No-Build Average Delay (sec)	Build LOS	Build Average Delay (sec)
1)	Chelsea Street @ Porter Street	EB	C	24.2	C	26.5
		NB	C	15.1	C	15.5
		SB	C	16.8	C	17.2
		OVERALL	C	20.2	C	21.5
2)	Porter Street @ Orleans Street	EB	B	6.1	B	6.1
		WB	B	5.1	B	5.1
		NB	B	11.1	B	11.1
		SB	B	10.0	B	10.0
		OVERALL	B	7.2	B	7.2
3A)	Sumner Street @ Maverick Square (Meridian Street)	EB	C	15.6	C	15.6
		WB	C	21.6	C	23.7
		OVERALL	C	19.3	C	20.7
3B)	Sumner Street @ Maverick Square (Chelsea Street)	EB	B	12.1	B	12.1
		WB	B	12.1	B	12.1
		SB	B	13.7	B	14.4
		OVERALL	B	13.2	B	13.7

- Continued -

TABLE G.2-3 (Continued)

UNSIGNALIZED INTERSECTIONS

			No-Build		Build	
	Intersection	Movement	LOS	Reserve Capacity	LOS	Reserve Capacity
4)	Bremen Street	EB L	A	992	A	992
	@ Porter Street	WB L	A	889	A	886
		NB	B	346	B	336
		SB	D	189	D	184
5A)	Maverick Street	NB	A	423	A	400
	@ Maverick Square	SB	F	–7	F	–23
	(Meridian Street)					
5B)	Maverick Street	EB L	A	620	A	589
	@ Maverick Square	WB L	A	757	A	755
	(Chelsea Street)	SB	E	62	E	45
6)	Maverick Street	WB L	A	1,155	A	1,155
	@ Orleans Street	NB	B	313	C	260
		SB	A	579	A	574
7)	Maverick Street			– NOT IMPACTED –		
	@ Cottage Street					
8)	Sumner Street	EB L	A	1,042	A	1,031
	@ Bremen Street	WB L	A	756	A	752
		NB	B	400	B	391
		SB	C	261	C	251
9)	Sumner Street	EB L	A	1,104	A	1,104
	@ Orleans Street	NB	C	255	C	202
		SB	A	499	A	473
10)	Sumner Street			– NOT IMPACTED –		
	@ Cottage Street					

APPENDIX G-3

EXISTING CONDITIONS
TRAFFIC ANALYSIS

```
 1                          HMM ASSOCIATES                          5/26/1988

                               1752-119                              I1AM88
RSECTION :                                                         REVISED
ER @                                                                6/6/88
EA
AY    AM PEAK           1988              CBD ? Y
ATED SIGNAL

-------------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

ACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
      MVM  VOLUME   IN GROUP     FACTOR       RATE         LT     RT
----  ---  ------   --------     ------       ----        ----   ----
      LTR   348        387        1.00         387        0.40   0.20




      TR    162        180        1.00         180        0.00   0.10


      LT    111        123        1.00         123        0.19   0.00



-------------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- -------- -----  -----  ---- -----  ----  ---- ----  ----  ----    ----
LTR   1800     1     1.13  0.99  1.00  1.00  1.00 0.90  0.87  0.85    1340




TR    1800     1     1.07  0.99  1.00  1.00  1.00 0.90  0.94  1.00    1613


LT    1800     1     1.07  0.99  1.00  1.00  1.00 0.90  1.00  0.93    1596
```

```
                                    1752-119                             I1AM88
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   AM PEAK           1988              CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------

                      C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW             GREEN    LN GR    V/C
APP   MVM    RATE  LT FLOW  FLW RT   RATIO   CRIT ?   RATIO  CAPACITY  RATIO
---   ---    ----  -------  ------   -----   ------   -----  --------  -----
EB    LTR     387         0     1340  0.289     Y      0.529       709  0.546


WB


NB    TR      180         0     1613  0.112     Y      0.392       633  0.284


SB    LT      123         0     1596  0.077     N      0.392       626  0.196


CYCLE LENGTH :    102.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.401
LOSS TIME PER CYCLE :    6          INTERSECTION V/C : 0.426

--------------------------------------------------------------------------------
                       L E V E L   O F   S E R V I C E

     LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR    APP  APP
APP   MVM   RATIO RATIO  LEN  DELAY  CAP  DELAY    PF    DELAY  LOS   DELAY LOS
---   ---   ----- -----  ---  -----  ---  -----    --    -----  ---   ----- ---
EB     LTR 0.546 0.529  102   12.1   709    0.7  0.85    10.9    B     10.8  B


WB


NB     TR  0.284 0.392  102   16.1   633    0.1  0.85    13.8    B     13.6  B


SB     LT  0.196 0.392  102   15.5   626    0.0  0.85    13.2    B     13.0  B



                                        INTERSECTION DELAY : 11.9 secs/veh
                                        LEVEL OF SERVICE : B
```

```
i                               HMM ASSOCIATES                               5/26/1988

                                   1752-119                                   I1PM88
RSECTION :
ER @
EA
AY    PM PEAK          1988              CBD ? Y
ATED SIGNAL

-----------------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

ACH    LANE GROUP    FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
      MVM   VOLUME    IN GROUP    FACTOR        RATE         LT      RT
----  ---   ------    --------    ------        ----        ----    ----
      LTR    562         624       1.00          624         0.53    0.16



      TR     244         271       1.00          271         0.00    0.15


      LT     276         307       1.00          307         0.21    0.00


-----------------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES   WIDTH  H.V.  GRADE  PARK   BUS   AREA   RT    LT    FLOW
--- -------- -----   -----  ----  -----  ----   ----  ----  ----  ----   ----
LTR   1800     1      1.13  0.99  1.00   1.00   1.00  0.90  0.90  0.83   1354



TR    1800     1      1.07  0.99  1.00   1.00   1.00  0.90  0.90  1.00   1544


LT    1800     1      1.07  0.99  1.00   1.00   1.00  0.90  1.00  0.84   1441
```

```
                                 1752-119                              I1PM88
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   PM PEAK           1988             CBD ? Y
ACTUATED SIGNAL

---------------------------------------------------------------------------

                    C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW              GREEN   LN GR    V/C
APP  MVM     RATE   LT FLOW FLW RT  RATIO   CRIT ?   RATIO  CAPACITY  RATIO
---  ---     ----   ------- ------  -----   ------   -----  --------  -----
EB   LTR      624       0     1354  0.461     Y      0.529      717   0.870


WB


NB   TR       271       0     1544  0.176     N      0.392      605   0.448


SB   LT       307       0     1441  0.213     Y      0.392      565   0.543

CYCLE LENGTH :   102.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.674
LOSS TIME PER CYCLE :    6         INTERSECTION V/C : 0.716

---------------------------------------------------------------------------
                     L E V E L   O F   S E R V I C E

     LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP  MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
---  ---   ----- -----  ---  -----  ---   -----   --    -----  ---   ----- ---
EB    LTR  0.870 0.529  102   15.9   717    7.9  0.85    20.2   C     20.1  C


WB


NB    TR   0.448 0.392  102   17.4   605    0.4  0.85    15.1   C     15.0  B


SB    LT   0.543 0.392  102   18.2   565    0.8  0.85    16.1   C     16.0  C


                                     INTERSECTION DELAY : 17.9 secs/veh
                                     LEVEL OF SERVICE : C
```

```
i                              HMM ASSOCIATES                               5/26/1988

                                  1752-119                                     I2AM88
RSECTION :
ER @
ANS
DAY    AM PEAK            1988                  CBD ? Y
ATED SIGNAL

------------------------------------------------------------------------------------
                  V O L U M E   A D J U S T M E N T

ACH    LANE  GROUP     FLOW RATE   LANE UTIL      ADJ FLOW      PROP OF  TURNS
       MVM   VOLUME     IN GROUP     FACTOR         RATE          LT       RT
----   ---   ------     --------     ------         ----         ----     ----
       LTR    160         178         1.00           178          0.31     0.22


       LTR     84          93         1.00            93          0.49     0.05


       LTR     60          67         1.00            67          0.45     0.46


       LTR     36          40         1.00            40          0.11     0.61



------------------------------------------------------------------------------------
                  S A T U R A T I O N   F L O W

    IDEAL    # OF    --------------ADJUSTMENT FACTORS---------------     ADJ.
MVM SAT FLOW LANES   WIDTH  H.V.  GRADE  PARK   BUS  AREA   RT    LT     FLOW
--- -------- -----   -----  ----  -----  ----  ----  ----  ----  ----    ----
LTR   1800     1      1.13  0.99  1.00   1.00  1.00  0.90  0.87  0.97    1529


LTR   1800     1      1.13  0.99  1.00   1.00  1.00  0.90  0.97  0.89    1565


LTR   1800     1      1.00  0.99  1.00   1.00  1.00  0.90  0.84  0.98    1320


LTR   1800     1      0.90  0.99  1.00   1.00  1.00  0.90  0.82  1.00    1184
```

```
                                  1752-119                               I2AM88
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   AM PEAK             1988             CBD ? Y
ACTUATED SIGNAL

-----------------------------------------------------------------------------

                    C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW                GREEN    LN GR    V/C
APP   MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?     RATIO  CAPACITY  RATIO
---   ---     ----  -------  ------  -----    -------    -----  --------  -----
EB    LTR      178        0    1529  0.116       Y       0.548       838  0.212


WB    LTR       93        0    1565  0.059       N       0.548       858  0.108


NB    LTR       67        0    1320  0.051       Y       0.342       452  0.148


SB    LTR       40        0    1184  0.034       N       0.342       405  0.099

CYCLE LENGTH :     73.0           SUM OF CRITICAL LANES' FLOW RATIOS : 0.167
LOSS TIME PER CYCLE :     6       INTERSECTION V/C : 0.182

-----------------------------------------------------------------------------
                     L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC   1st  LN GR   2nd           LN GR LN GR   APP  APP
APP   MVM   RATIO  RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
---   ---   -----  -----  ---  -----  ---   -----    --    -----  ---   ----- ---
EB     LTR  0.212  0.548   73    6.4   838    0.0  0.85      5.4   B      5.3  B


WB     LTR  0.108  0.548   73    6.0   858    0.0  0.85      5.1   B      5.0  A


NB     LTR  0.148  0.342   73   12.6   452    0.0  0.85     10.7   B     10.4  B


SB     LTR  0.099  0.342   73   12.4   405    0.0  0.85     10.5   B     10.0  B



                                      INTERSECTION DELAY :  6.6 secs/veh
                                      LEVEL OF SERVICE : B
```

```
 1                           HMM ASSOCIATES                           5/26/1988

                                1752-119                 -             12PM88
RSECTION :
ER @
ANS
DAY   PM PEAK         1988             CBD ? Y
ATED SIGNAL

------------------------------------------------------------------------------
                   V O L U M E   A D J U S T M E N T

OACH    LANE GROUP    FLOW RATE   LANE UTIL     ADJ FLOW    PROP OF TURNS
     MVM   VOLUME     IN GROUP    FACTOR       RATE         LT      RT
----  ---  ------     --------    ------       ----        ----    ----
     LTR    228         253        1.00         253        0.06    0.18


     LTR     91         101        1.00         101        0.37    0.04


     LTR     87          97        1.00          97        0.72    0.19


     LTR     31          34        1.00          34        0.13    0.65



------------------------------------------------------------------------------
                   S A T U R A T I O N   F L O W

     IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V.  GRADE  PARK   BUS  AREA   RT    LT    FLOW
--- -------- -----  -----  ----  -----  ----  ----  ----  ----  ----   ----
LTR   1800     1     1.13  0.99  1.00   1.00  1.00  0.90  0.89  1.00   1613


LTR   1800     1     1.13  0.99  1.00   1.00  1.00  0.90  0.97  0.85   1494


LTR   1800     1     1.00  0.99  1.00   1.00  1.00  0.90  0.88  0.94   1327


LTR   1800     1     0.90  0.99  1.00   1.00  1.00  0.90  0.81  1.00   1169
```

```
                                        1752-119                                 12PM88
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   PM PEAK              1988                CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------

                      C A P A C I T Y   A N A L Y S I S

       LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW                GREEN    LN GR    V/C
APP     MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
---     ---     ----  -------  ------  -----    ------    -----  --------  -----
EB      LTR      253        0    1613  0.157      Y       0.548       884  0.286


WB      LTR      101        0    1494  0.068      N       0.548       819  0.123


NB      LTR       97        0    1327  0.073      Y       0.342       454  0.214


SB      LTR       34        0    1169  0.029      N       0.342       400  0.085

CYCLE LENGTH :     73.0            SUM OF CRITICAL LANES' FLOW RATIOS : 0.230
LOSS TIME PER CYCLE :    6         INTERSECTION V/C : 0.251

--------------------------------------------------------------------------------
                       L E V E L   O F   S E R V I C E

       LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR    APP  APP
APP     MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
---     ---   ----- -----  ---  -----  ---   -----    --    -----  ---   ----- ---
EB       LTR  0.286 0.548   73    6.7   884    0.1  0.85      5.8   B      5.8  B


WB       LTR  0.123 0.548   73    6.1   819    0.0  0.85      5.2   B      5.1  B


NB       LTR  0.214 0.342   73   12.9   454    0.0  0.85     11.0   B     10.8  B


SB       LTR  0.085 0.342   73   12.4   400    0.0  0.85     10.5   B      9.9  B



                                          INTERSECTION DELAY :  7.0 secs/veh
                                          LEVEL OF SERVICE : B
```

```
 1                           HMM ASSOCIATES                        5/26/1988

                                1752-119                              I3AM88
RSECTION :
ER @
IAN
AY    AM PEAK             1988              CBD ? Y
ATED SIGNAL

----------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

ACH    LANE GROUP     FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
      MVM   VOLUME     IN GROUP    FACTOR        RATE          LT      RT
----  ---   ------     ---------   ------        ----         ----    ----
      LT     158         176        1.00          176         0.47    0.00


      T       74          82        1.00           82         0.00    0.00
      R      276         307        1.00          307         0.00    1.00

      R       10          11        1.00           11         0.00    1.00



----------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL    # OF  --------------ADJUSTMENT FACTORS---------------   ADJ.
VM SAT FLOW LANES   WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
T      1800     1    1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.75   1359


T      1800     1    1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812
R      1800     1    1.03  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1404

R      1800     1    0.87  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1186
```

```
                                1752-119                                   13AM88
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   AM PEAK           1988              CBD ? Y
ACTUATED SIGNAL

-----------------------------------------------------------------------------------

                   C A P A C I T Y   A N A L Y S I S

    LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW             GREEN    LN GR    V/C
APP  MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?   RATIO  CAPACITY  RATIO
---  ---     ----  -------  ------  -----    ------   -----  --------  -----
EB   LT       176        0    1359  0.130      N      0.286       388  0.454


WB   T         82        0    1812  0.045      N      0.286       518  0.158
     R        307        0    1404  0.219      Y      0.286       401  0.766

SB   R         11        0    1186  0.009      Y      0.357       424  0.026

CYCLE LENGTH :    70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.228
LOSS TIME PER CYCLE :    6         INTERSECTION V/C : 0.249

-----------------------------------------------------------------------------------
                    L E V E L   O F   S E R V I C E

    LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP  MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF   DELAY  LOS   DELAY LOS
---  ---   ----- -----  ---  -----  ---   -----    --   -----  ---   ----- ---
EB    LT   0.454 0.286   70   15.6  388     0.6  0.85    13.8   B     13.6  B


WB    T    0.158 0.286   70   14.2  518     0.0  0.85    12.1   B
      R    0.766 0.286   70   17.4  401     5.9  0.85    19.8   C     18.1  C

SB    R    0.026 0.357   70   11.1  424     0.0  0.85     9.4   B      8.0  B



                                     INTERSECTION DELAY : 16.4 secs/veh
                                     LEVEL OF SERVICE : C
```

```
 1                          HMM ASSOCIATES                            5/26/1988

                                1752-119                               I3PM88
RSECTION :
ER @
DIAN
DAY   PM PEAK         1988                CBD ? Y
ATED SIGNAL

---------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

DACH   LANE GROUP   FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
       MVM  VOLUME   IN GROUP    FACTOR        RATE         LT      RT
----   ---  ------   --------    ------        ----        ----    ----
       LT    167       186        1.00         186         0.44    0.00


       T      71        79        1.00          79         0.00    0.00
       R     259       288        1.00         288         0.00    1.00

       R      10        11        1.00          11         0.00    1.00



---------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

    IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- -------- -----  -----  ---- -----  ----  ---- ----  ----  ----    ----
LT    1800     1     1.13  0.99  1.00  1.00  1.00 0.90  1.00  0.79    1432


T     1800     1     1.13  0.99  1.00  1.00  1.00 0.90  1.00  1.00    1812
R     1800     1     1.03  0.99  1.00  1.00  1.00 0.90  0.85  1.00    1404

R     1800     1     0.87  0.99  1.00  1.00  1.00 0.90  0.85  1.00    1186
```

```
                                   1752-119                              I3PM88
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   PM PEAK          1988               CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------

                      C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW              GREEN    LN GR    V/C
APP   MVM    RATE   LT FLOW  FLW RT  RATIO    CRIT ?   RATIO  CAPACITY  RATIO
---   ---    ----   -------  ------  -----    ------   -----  --------  -----
EB    LT      186         0    1432  0.130      N      0.286       409  0.455


WB    T        79         0    1812  0.044      N      0.286       518  0.153
      R       288         0    1404  0.205      Y      0.286       401  0.718

SB    R        11         0    1186  0.009      Y      0.357       424  0.026


CYCLE LENGTH :    70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.214
LOSS TIME PER CYCLE :     6        INTERSECTION V/C : 0.234

--------------------------------------------------------------------------------
                       L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP   MVM   RATIO RATIO  LEN  DELAY   CAP   DELAY    PF   DELAY  LOS   DELAY LOS
---   ---   ----- -----  ---  -----   ---   -----    --   -----  ---   ----- ---
EB     LT   0.455 0.286   70   15.6   409     0.6  0.85    13.8   B     13.7  B


WB     T    0.153 0.286   70   14.2   518     0.0  0.85    12.1   B
       R    0.718 0.286   70   17.1   401     4.2  0.85    18.1   C     16.8  C

SB     R    0.026 0.357   70   11.1   424     0.0  0.85     9.4   B      8.0  B



                                          INTERSECTION DELAY : 15.5 secs/veh
                                          LEVEL OF SERVICE : C
```

```
                           HMM ASSOCIATES                          5/26/1988

                              1752-119                             I4AM88
SECTION :
R @
N
```
AY   ~~PM~~ AM PEAK   1988   CBD?Y
```
NALIZED
JOR STREET RUNS EAST / WEST

-------------------------------------------------------------------------------

NSIGNALIZED  CRITICAL  GAPS

          -----------CRITICAL GAPS (SEC)----------
PP        LEFT TURN        THROUGH        RIGHT TURN
--        ---------        -------        ----------

B            5.00            ---             ---

B            5.00            ---             ---

B            6.50            6.00            5.50

B            6.50            6.00            5.50

-------------------------------------------------------------------------------

   VOLUME  ALLOCATION  TO  LANES

         LANE 1             LANE 2             LANE 3
       L    T    R       L    T    R       L    T    R
     --------------    --------------    --------------

      47    0    0       0  104   22       0    0    0
       7   42   31       0    0    0       0    0    0
       2   13    0       0    0    0       0    0    0
      77  183    0       0    0    0       0    0    0

-------------------------------------------------------------------------------

                  UNSIGNALIZED

                           LANE 1    LANE 2    LANE 3
                           -------   -------   -------

     RESERVE CAPACITY       1068       ---       ---
     LEVEL OF SERVICE         A

     RESERVE CAPACITY       1050       ---       ---
     LEVEL OF SERVICE         A

     RESERVE CAPACITY        664       ---       ---
     LEVEL OF SERVICE         A

     RESERVE CAPACITY        465       ---       ---
     LEVEL OF SERVICE         A

R STREET - EB/WB
```

```
INTERSECTION :
PORTER @
BREMAN
WEEKDAY   PM PEAK          1988             CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

               -----------CRITICAL GAPS (SEC)----------
    APP        LEFT TURN      THROUGH      RIGHT TURN
    ---        ---------      -------      ----------

    EB            5.00          ---           ---

    WB            5.00          ---           ---

    NB            6.50          6.00          5.50

    SB            6.50          6.00          5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1           LANE 2           LANE 3
  APP       L    T    R      L    T    R      L    T    R
  ---     --------------   --------------   --------------

  EB       37    0    0      0  202   29      0    0    0
  WB        3   87   45      0    0    0      0    0    0
  NB       19  107   10      0    0    0      0    0    0
  SB       86  159    0      0    0    0      0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                           LANE 1    LANE 2    LANE 3
  ---                           -------   -------   -------

  EB       RESERVE CAPACITY      1013       ---       ---
           LEVEL OF SERVICE        A

  WB       RESERVE CAPACITY       946       ---       ---
           LEVEL OF SERVICE        A

  NB       RESERVE CAPACITY       441       ---       ---
           LEVEL OF SERVICE        A

  SB       RESERVE CAPACITY       302       ---       ---
           LEVEL OF SERVICE        B

MAJOR STREET - EB/WB
```

```
                             HMM ASSOCIATES                       5/26/1988

                                1752-119                             I5AM88
RSECTION :
RICK @
DIAN
DAY   AM PEAK            1988              CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------

NSIGNALIZED CRITICAL GAPS

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           5.50           5.00           5.00

SB           5.50           5.00           5.00


---------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1           LANE 2           LANE 3
P      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

        0    1    0      0    0    0      0    0    0
        0   57    0      0    0  210      0    0    0
       27    0    0      0  269   74      0    0    0
      226    0   23      0    0    0      0    0    0

---------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                         LANE 1    LANE 2    LANE 3
-                         -------   -------   -------

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      972       615       ---
      LEVEL OF SERVICE       A         A

      RESERVE CAPACITY      307       ---       ---
      LEVEL OF SERVICE       B

R STREET - EB/WB
```

```
                                     HMM ASSOCIATES                            5/26/1988

                                        1752-119                                 ISPM88
INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY   PM PEAK           1988                CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

               -----------CRITICAL GAPS (SEC)----------
    APP        LEFT TURN       THROUGH        RIGHT TURN
    ---        ---------       -------        ----------

    EB            5.00           ---             ---

    WB            5.00           ---             ---

    NB            5.50           5.00            5.00

    SB            5.50           5.00            5.00


-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1            LANE 2            LANE 3
  APP       L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB        0    1    0       0    0    0       0    0    0
  WB        0   42    0       0    0  291       0    0    0
  NB       20    0    0       0  250  133       0    0    0
  SB      268    0   46       0    0    0       0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                            LANE 1    LANE 2    LANE 3
  ---                            -------   -------   -------

  EB      RESERVE CAPACITY         ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY         ---       ---       ---
          LEVEL OF SERVICE

  NB      RESERVE CAPACITY         957       559       ---
          LEVEL OF SERVICE          A         A

  SB      RESERVE CAPACITY         225       ---       ---
          LEVEL OF SERVICE          C

MAJOR STREET - EB/WB
```

```
SECTION :
ICK @
NS
AY   AM PEAK            1988              CBD?Y
NALIZED
JOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

         -----------CRITICAL GAPS (SEC)----------
PP       LEFT TURN       THROUGH        RIGHT TURN
--       ---------       -------        ----------

B           5.00           ---             ---

B           5.00           ---             ---

B           6.50           6.00            5.50

B           6.50           6.00            5.50

-----------------------------------------------------------------------------

   V O L U M E   A L L O C A T I O N   T O   L A N E S

        LANE 1            LANE 2            LANE 3
      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

      0    0   10      0    0    0      0    0    0
     23    0    0      0  308    3      0    0    0
     51   50    0      0    0    0      0    0    0
      0   15   13      0    0    0      0    0    0

-----------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1    LANE 2    LANE 3
-                          -------   -------   -------

     RESERVE CAPACITY        ---       ---       ---
     LEVEL OF SERVICE

     RESERVE CAPACITY       1165       ---       ---
     LEVEL OF SERVICE         A

     RESERVE CAPACITY        520       ---       ---
     LEVEL OF SERVICE         A

     RESERVE CAPACITY        682       ---       ---
     LEVEL OF SERVICE         A

R STREET - EB/WB
```

```
INTERSECTION :
MAVERICK @
ORLEANS
WEEKDAY   PM PEAK            1988               CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN       THROUGH      RIGHT TURN
    ---      ---------       -------      ----------

    EB          5.00           ---           ---

    WB          5.00           ---           ---

    NB          6.50           6.00          5.50

    SB          6.50           6.00          5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---      --------------    --------------    --------------

  EB         0    0   10       0    0    0       0    0    0
  WB        30    0    0       0  336   14       0    0    0
  NB        28   62    0       0    0    0       0    0    0
  SB         0    9   38       0    0    0       0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                            LANE 1    LANE 2    LANE 3
  ---                            -------   -------   -------

  EB      RESERVE CAPACITY         ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY        1158       ---       ---
          LEVEL OF SERVICE          A

  NB    . RESERVE CAPACITY         502       ---       ---
          LEVEL OF SERVICE          A

  SB      RESERVE CAPACITY         673       ---       ---
          LEVEL OF SERVICE          A

  MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                         5/26/1988

                                 1752-119                            I7AM88
SECTION :
ICK @
GE
AY   AM PEAK            1988              CBD?Y
NALIZED
JOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
PP        LEFT TURN        THROUGH       RIGHT TURN
--        ---------        -------       ----------

B            5.00            ---            ---

B            5.00            ---            ---

B            6.50            6.00           5.50

B            6.50            6.00           5.50

--------------------------------------------------------------------------

   V O L U M E   A L L O C A T I O N   T O   L A N E S

        LANE 1            LANE 2            LANE 3
      L    T    R      L    T    R      L    T    R
     --------------   --------------   --------------

       0    0   10     0    0    0      0    0    0
      17  274    0     0    0    0      0    0    0
       0    0   10     0    0    0      0    0    0
       0   32   32     0    0    0      0    0    0

--------------------------------------------------------------------------

                  U N S I G N A L I Z E D

                          LANE 1     LANE 2     LANE 3
                          -------    -------    -------

      RESERVE CAPACITY      ---        ---        ---
      LEVEL OF SERVICE

      RESERVE CAPACITY     1171        ---        ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY     1083        ---        ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY      685        ---        ---
      LEVEL OF SERVICE       A

R STREET - EB/WB
```

```
                                  HMM ASSOCIATES                         5/26/1988

                                     1752-119                             I7PM88
INTERSECTION :
MAVERICK @
COTTAGE
WEEKDAY   PM PEAK           1988                CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-------------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

               -----------CRITICAL GAPS (SEC)----------
    APP        LEFT TURN       THROUGH       RIGHT TURN
    ---        ---------       -------       ----------

    EB            5.00           ---            ---

    WB            5.00           ---            ---

    NB            6.50           6.00           5.50

    SB            6.50           6.00           5.50

-------------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1            LANE 2            LANE 3
  APP       L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB        0    0   10       0    0    0       0    0    0
  WB       22  304    0       0    0    0       0    0    0
  NB        0    0   10       0    0    0       0    0    0
  SB        0   63   49       0    0    0       0    0    0

-------------------------------------------------------------------------------

                         U N S I G N A L I Z E D

  APP                              LANE 1    LANE 2    LANE 3
  ---                              -------   -------   -------

  EB      RESERVE CAPACITY           ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY          1166       ---       ---
          LEVEL OF SERVICE            A

  NB      RESERVE CAPACITY          1083       ---       ---
          LEVEL OF SERVICE            A

  SB      RESERVE CAPACITY           599       ---       ---
          LEVEL OF SERVICE            A

MAJOR STREET - EB/WB
```

```
                          HMM ASSOCIATES                         6/6/1988

                             1752-119                             16AM88
RSECTION :
ER @
AN
DAY   AM PEAK          1988              CBD?Y
SNALIZED
AJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

         -----------CRITICAL GAPS (SEC)----------
APP      LEFT TURN       THROUGH       RIGHT TURN
---      ---------       -------       ----------

EB          5.00           ---            ---

WB          5.00           ---            ---

NB          6.50           6.00           5.50

SB          6.50           6.00           5.50

----------------------------------------------------------------------------

   V O L U M E   A L L O C A T I O N   T O   L A N E S

        LANE 1            LANE 2            LANE 3
P      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

      27  225   35      0    0    0      0    0    0
       1  101   12      0    0    0      0    0    0
      22   45   14      0    0    0      0    0    0
      49   15   42      0    0    0      0    0    0

----------------------------------------------------------------------------

                U N S I G N A L I Z E D

P                         LANE 1    LANE 2    LANE 3
-                         -------   -------   -------

     RESERVE CAPACITY      1044       ---       ---
     LEVEL OF SERVICE       A

     RESERVE CAPACITY       919       ---       ---
     LEVEL OF SERVICE       A

     RESERVE CAPACITY       538       ---       ---
     LEVEL OF SERVICE       A

     RESERVE CAPACITY       532       ---       ---
     LEVEL OF SERVICE       A

R STREET - EB/WB
```

```
                                   HMM ASSOCIATES                              5/26/1988

                                      1752-119                                 I8PM88
INTERSECTION :
SUMNER @
BREMAN
WEEKDAY   PM PEAK           1988                CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN        THROUGH       RIGHT TURN
    ---      ---------        -------       ----------

    EB          5.00            ---            ---

    WB          5.00            ---            ---

    NB          6.50           6.00           5.50

    SB          6.50           6.00           5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1            LANE 2            LANE 3
  APP       L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB       23  315   30       0    0    0       0    0    0
  WB        1   73   12       0    0    0       0    0    0
  NB       21   48   32       0    0    0       0    0    0
  SB       82    8   15       0    0    0       0    0    0

-----------------------------------------------------------------------------

                       U N S I G N A L I Z E D

  APP                             LANE 1    LANE 2    LANE 3
  ---                             -------   -------   -------

  EB      RESERVE CAPACITY         1079       ---       ---
          LEVEL OF SERVICE           A

  WB      RESERVE CAPACITY          840       ---       ---
          LEVEL OF SERVICE           A

  NB      RESERVE CAPACITY          512       ---       ---
          LEVEL OF SERVICE           A

  SB      RESERVE CAPACITY          381       ---       ---
          LEVEL OF SERVICE           B

MAJOR STREET - EB/WB
```

```
RSECTION :
ER @
ANS
DAY   AM PEAK          1988              CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------

NSIGNALIZED  CRITICAL  GAPS

         -----------CRITICAL GAPS (SEC)----------
APP      LEFT TURN        THROUGH      RIGHT TURN
---      ---------        -------      ----------

EB          5.00            ---           ---

WB          5.00            ---           ---

NB          6.00           5.50          5.00

SB          6.00           5.50          5.00

--------------------------------------------------------------------------

   VOLUME  ALLOCATION  TO  LANES

          LANE 1           LANE 2           LANE 3
P      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

      51  168   23      0    0    0      0    0    0
       0    0   10      0    0    0      0    0    0
     115   66   14      0    0    0      0    0    0
      28    0    4      0    0    0      0    0    0

--------------------------------------------------------------------------

                  UNSIGNALIZED

P                         LANE 1    LANE 2    LANE 3
-                         -------   -------   -------

     RESERVE CAPACITY      1136       ---       ---
     LEVEL OF SERVICE        A

     RESERVE CAPACITY       ---       ---       ---
     LEVEL OF SERVICE

     RESERVE CAPACITY       585       ---       ---
     LEVEL OF SERVICE        A

     RESERVE CAPACITY       645       ---       ---
     LEVEL OF SERVICE        A

OR STREET - EB/WB
```

```
                        HMM ASSOCIATES                          5/26/1988

                          1752-119                               19PM88
INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY   PM PEAK          1988               CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

              -----------CRITICAL GAPS (SEC)----------
   APP        LEFT TURN      THROUGH      RIGHT TURN
   ---        ---------      -------      ----------

   EB            5.00          ---           ---

   WB            5.00          ---           ---

   NB            6.00          5.50          5.00

   SB            6.00          5.50          5.00


-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1           LANE 2           LANE 3
 APP        L    T    R      L    T    R      L    T    R
 ---       --------------   --------------   --------------

 EB        77  320   31      0    0    0      0    0    0
 WB         0    0   10      0    0    0      0    0    0
 NB        87   57   34      0    0    0      0    0    0
 SB         9   10    9      0    0    0      0    0    0

-----------------------------------------------------------------------------

                       U N S I G N A L I Z E D

 APP                           LANE 1    LANE 2    LANE 3
 ---                           -------   -------   -------

 EB      RESERVE CAPACITY       1110       ---       ---
         LEVEL OF SERVICE        A

 WB      RESERVE CAPACITY        ---       ---       ---
         LEVEL OF SERVICE

 NB      RESERVE CAPACITY        456       ---       ---
         LEVEL OF SERVICE        A

 SB      RESERVE CAPACITY        643       ---       ---
         LEVEL OF SERVICE        A

MAJOR STREET - EB/WB
```

```
                            HMM ASSOCIATES                      5/26/1988

                                1752-119                           I10AM88
SECTION :
R @
GE
AY   AM PEAK           1988             CBD?Y
NALIZED
JOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

         -----------CRITICAL GAPS (SEC)----------
PP       LEFT TURN        THROUGH        RIGHT TURN
--       ---------        -------        ----------

B           5.00            ---             ---

B           5.00            ---             ---

B           6.50            6.00            5.50

B           6.50            6.00            5.50

---------------------------------------------------------------------------

   V O L U M E   A L L O C A T I O N   T O   L A N E S

        LANE 1            LANE 2            LANE 3
      L    T    R      L    T    R      L    T    R
    --------------  --------------  --------------

       0  186   47      0    0    0      0    0    0
       0    0   10      0    0    0      0    0    0
       0    0   10      0    0    0      0    0    0
      19   20    0      0    0    0      0    0    0

---------------------------------------------------------------------------

                 U N S I G N A L I Z E D

                         LANE 1    LANE 2    LANE 3
                         -------   -------   -------

     RESERVE CAPACITY      ---       ---       ---
     LEVEL OF SERVICE

     RESERVE CAPACITY      ---       ---       ---
     LEVEL OF SERVICE

     RESERVE CAPACITY      860       ---       ---
     LEVEL OF SERVICE       A

     RESERVE CAPACITY      681       ---       ---
     LEVEL OF SERVICE       A

R STREET - EB/WB
```

```
                              HMM ASSOCIATES                          5/26/1988

                                 1752-119                              I10PM88
INTERSECTION :
SUMNER @
COTTAGE
WEEKDAY   PM PEAK            1988             CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   UNSIGNALIZED  CRITICAL  GAPS

             ----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN      THROUGH      RIGHT TURN
    ---      ---------      -------      ----------

    EB         5.00           ---           ---

    WB         5.00           ---           ---

    NB         6.50           6.00          5.50

    SB         6.50           6.00          5.50

-----------------------------------------------------------------------------

        VOLUME  ALLOCATION  TO  LANES

              LANE 1            LANE 2            LANE 3
  APP       L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB         0  309   54       0    0    0       0    0    0
  WB         0    0   10       0    0    0       0    0    0
  NB         0    0   10       0    0    0       0    0    0
  SB        22   28    0       0    0    0       0    0    0

-----------------------------------------------------------------------------

                        UNSIGNALIZED

  APP                             LANE 1    LANE 2    LANE 3
  ---                             -------   -------   -------

  EB      RESERVE CAPACITY          ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY          ---       ---       ---
          LEVEL OF SERVICE

  NB      RESERVE CAPACITY          743       ---       ---
          LEVEL OF SERVICE           A

  SB      RESERVE CAPACITY          562       ---       ---
          LEVEL OF SERVICE           A

MAJOR STREET - EB/WB
```

```
E 1                          HMM ASSOCIATES                            5/26/1988

                                1752-119                                I11AM88
ERSECTION :
NER @
LSEA
KDAY   AM PEAK          1988             CBD ? Y
JATED SIGNAL

-------------------------------------------------------------------------------
                  V O L U M E   A D J U S T M E N T

ROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
        MVM  VOLUME   IN GROUP    FACTOR       RATE         LT      RT
-----   ---  ------   --------    ------       ----         ----    ----
        T     84        93         1.00         93          0.00    0.00


        T     165       183        1.05         192         0.00    0.00


        L     200       222        1.00         222         1.00    0.00
        R     186       207        1.00         207         0.00    1.00


-------------------------------------------------------------------------------
                  S A T U R A T I O N   F L O W

     IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------    ADJ.
MVM SAT FLOW LANES  WIDTH  H.V.  GRADE  PARK   BUS   AREA   RT    LT    FLOW
--- -------- -----  -----  ----  -----  ----   ----  ----   ----  ----  ----
T     1800     1     1.13  0.99  1.00   1.00   1.00  0.90   1.00  1.00  1812


T     1800     2     1.08  0.99  1.00   1.00   1.00  0.90   1.00  1.00  3464


L     1800     1     1.13  0.99  1.00   1.00   1.00  0.90   1.00  0.85  1540
R     1800     1     1.13  0.99  1.00   1.00   1.00  0.90   0.85  1.00  1540
```

```
                                          1752-119                                I11AM88
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   AM PEAK             1988               CBD ? Y
ACTUATED SIGNAL

---------------------------------------------------------------------------------

                        C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW               GREEN    LN GR     V/C
APP  MVM     RATE   LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
---  ---     ----   -------  ------  -----    ------    -----  --------  -----
EB    T        93         0    1812  0.051       N      0.286       518  0.180


WB    T       192         0    3464  0.055       Y      0.286       990  0.194


SB    L       222         0    1540  0.144       Y      0.357       550  0.404
      R       207         0    1540  0.134       N      0.357       550  0.376

CYCLE LENGTH :     70.0                SUM OF CRITICAL LANES' FLOW RATIOS : 0.199
LOSS TIME PER CYCLE :     6            INTERSECTION V/C : 0.218

---------------------------------------------------------------------------------
                         L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP   MVM   RATIO RATIO   LEN  DELAY  CAP   DELAY    PF   DELAY  LOS   DELAY LOS
---   ---   ----- -----   ---  -----  ---   -----    --   -----  ---   ----- ---
EB     T    0.180 0.286    70   14.3   518    0.0  0.85    12.2   B     11.9  B


WB     T    0.194 0.286    70   14.4   990    0.0  0.85    12.2   B     12.1  B


SB     L    0.404 0.357    70   12.8   550    0.3  0.85    11.1   B
       R    0.376 0.357    70   12.7   550    0.2  0.85    11.0   B     11.0  B


                                        INTERSECTION DELAY : 11.4 secs/veh
                                        LEVEL OF SERVICE : B
```

```
E 1                           HMM ASSOCIATES                       5/26/1988

                                 1752-119                             I11PM88
ERSECTION :
NER @
 SEA
 DAY   PMN PEAK          1988              CBD ? Y
JATED SIGNAL

-----------------------------------------------------------------------------
                     V O L U M E   A D J U S T M E N T

ROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
       MVM   VOLUME    IN GROUP    FACTOR       RATE         LT      RT
-----  ---   ------    --------    ------       ----        ----   ----
       T       92         102        1.00        102         0.00   0.00


       T      111         123        1.05        129         0.00   0.00


       L      276         307        1.00        307         1.00   0.00
       R      219         243        1.00        243         0.00   1.00


-----------------------------------------------------------------------------
                     S A T U R A T I O N   F L O W

      IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
 MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT     FLOW
 --- -------- -----  -----  ---- ------ ----  ----  ----  ----  ----   ----
 T      1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812


 T      1800     2     1.08  0.99  1.00  1.00  1.00  0.90  1.00  1.00   3464


 L      1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.85   1540
 R      1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1540
```

```
                                   1752-119                                   I11PM88
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   PMN PEAK          1988               CBD ? Y
ACTUATED SIGNAL

------------------------------------------------------------------------------------

                   C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW              GREEN   LN GR    V/C
APP   MVM    RATE   LT FLOW FLW RT  RATIO    CRIT ?   RATIO  CAPACITY  RATIO
---   ---    ----   ------- ------  -----    ------   -----  --------  -----
EB     T      102        0    1812  0.056      Y      0.286       518  0.197


WB     T      129        0    3464  0.037      N      0.286       990  0.130


SB     L      307        0    1540  0.199      Y      0.357       550  0.558
       R      243        0    1540  0.158      N      0.357       550  0.442

CYCLE LENGTH :    70.0               SUM OF CRITICAL LANES' FLOW RATIOS : 0.255
LOSS TIME PER CYCLE :    6           INTERSECTION V/C : 0.279

------------------------------------------------------------------------------------
                    L E V E L   O F   S E R V I C E

     LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR    APP  APP
APP   MVM  RATIO RATIO  LEN  DELAY  CAP   DELAY    PF   DELAY  LOS   DELAY LOS
---   ---  ----- -----  ---  -----  ---   -----    --   -----  ---   ----- ---
EB     T   0.197 0.286   70   14.4   518    0.0  0.85    12.2   B     12.0  B


WB     T   0.130 0.286   70   14.1   990    0.0  0.85    12.0   B     11.8  B


SB     L   0.558 0.357   70   13.7   550    1.0  0.85    12.5   B
       R   0.442 0.357   70   13.1   550    0.4  0.85    11.5   B     12.0  B


                                      INTERSECTION DELAY : 11.9 secs/veh
                                      LEVEL OF SERVICE : B
```

```
                               HMM ASSOCIATES                            5/26/1988

                                  1752-19                                  I12AM8
ERSECTION :
ERICK @
SEA
DAY   AM PEAK          1988             CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

           -----------CRITICAL GAPS (SEC)----------
 APP       LEFT TURN        THROUGH       RIGHT TURN
 ---       ---------        -------       ----------

 EB           5.00            ---            ---

 WB           5.00            ---            ---

 NB           0.00            0.00           0.00

 SB           6.50            6.00           5.50

-----------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

          LANE 1            LANE 2            LANE 3
P       L    T    R       L    T    R       L    T    R
-      --------------    --------------    --------------

       63    0    0       0    0  238       0    0    0
       51  135    0       0  106   90       0    0    0
        0    0    0       0    0    0       0    0    0
        0   94   26       0    0    0       0    0    0

-----------------------------------------------------------------------------

                   U N S I G N A L I Z E D

P                          LANE 1   LANE 2   LANE 3
-                          -------  -------  -------

B      RESERVE CAPACITY      790      ---      ---
       LEVEL OF SERVICE       A

B      RESERVE CAPACITY      890      ---      ---
       LEVEL OF SERVICE       A

B      RESERVE CAPACITY      ---      ---      ---
       LEVEL OF SERVICE

B      RESERVE CAPACITY      354      ---      ---
       LEVEL OF SERVICE       B

OR STREET - EB/WB
```

```
INTERSECTION :
MAVERICK @
CHELSEA
WEEKDAY   PM PEAK          1988              CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-------------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN       THROUGH        RIGHT TURN
    ---      ---------       -------        ----------

    EB          5.00           ---             ---

    WB          5.00           ---             ---

    NB          0.00          0.00            0.00

    SB          6.50          6.00            5.50


-------------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1            LANE 2            LANE 3
  APP       L    T    R      L    T    R      L    T    R
  ---     --------------   --------------   --------------

  EB       98    0    0      0    0  303      0    0    0
  WB       57  128    0      0  138  105      0    0    0
  NB        0    0    0      0    0    0      0    0    0
  SB        0  166   67      0    0    0      0    0    0

-------------------------------------------------------------------------------

                       U N S I G N A L I Z E D

  APP                           LANE 1    LANE 2    LANE 3
  ---                           -------   -------   -------

  EB      RESERVE CAPACITY        719       ---       ---
          LEVEL OF SERVICE         A

  WB      RESERVE CAPACITY        822       ---       ---
          LEVEL OF SERVICE         A

  NB      RESERVE CAPACITY        ---       ---       ---
          LEVEL OF SERVICE

  SB      RESERVE CAPACITY        168       ---       ---
          LEVEL OF SERVICE         D

MAJOR STREET - EB/WB
```

APPENDIX G–4

NO–BUILD CONDITION TRAFFIC ANALYSIS

```
                              HMM ASSOCIATES                     5/6/1988

                                 1752-119                           I1AMNB
ERSECTION :
TER @
LSEA
KDAY   AM PEAK          1992 NO BUILD     CBD?Y
UATED SIGNAL
-----------------------------------------------------------------------------
        T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
    GRADE   HV    ADJ. PKG LN.  BUSES         CONF. PEDS   PED BUTTON    ARR
P     (%)   (%)    Y/N   Nm     (Nb)   PHF   (peds/hr)   Y/N   SEC    TYPE
-   -----   ---    ---------    ----   ----  ----------  ----------   ----
B     0      2      N     0      0     0.90      0        N    0.0      3
B     0      2      N     0      0     0.90      0        N    0.0      3
B     0      2      N     0      0     0.90      0        N    0.0      3
B     0      2      N     0      0     0.90      0        N    0.0      3


-----------------------------------------------------------------------------
                  G E O M E T R I C S  /  V O L U M E S
                                           LANE GROUPS
         VOLUME                1                 2                  3
PP   LT     TH     RT    MVM   LNS   WD     MVM   LNS   WD     MVM   LNS   WD
--  ----------------     ----------------   ----------------   ----------------
EB   152    188    100   LTR    1    16.0
WB     0      0      0
NB     0    174     18   TR     1    14.0
SB    25    111      0   LT     1    14.0


-----------------------------------------------------------------------------
                    S I G N A L   P H A S I N G
PP    PHASE    1ST MV    2ND MV    3RD MV    PROT      PMSV       G      Y+R
--    -----    ------    ------    ------    ----      ----       --     ---
EB      1        LTR                                     LR       54      48
WB      2        TR                                      R        40      62
SB      2        LT                                      L        40      62
```

```
                                        1752-119                                   I1AMNE
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   AM PEAK          1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
           MVM   VOLUME   IN GROUP    FACTOR       RATE        LT     RT
--------   ---   ------   --------    ------       ----       ----   ----
EB         LTR    440        489       1.00        489        0.35   0.23


WB


NB         TR     192        213       1.00        213        0.00   0.09


SB         LT     136        151       1.00        151        0.18   0.00



--------------------------------------------------------------------------------
                        S A T U R A T I O N   F L O W

         IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM SAT FLOW LANES   WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT    FLOW
--- --- -------- -----   -----  ---- -----  ----  ----  ----  ----  ----   ----
EB  LTR   1800     1      1.13  0.99  1.00  1.00  1.00  0.90  0.87  0.85   1340


WB


NB  TR    1800     1      1.07  0.99  1.00  1.00  1.00  0.90  0.94  1.00   1613


SB  LT    1800     1      1.07  0.99  1.00  1.00  1.00  0.90  1.00  0.91   1562
```

```
E 2                            HMM ASSOCIATES                          6/6/1988

                                  1752-119                              I1AMNB
ERSECTION :
TER @
LSEA.
KDAY   AM PEAK           1992 NO BUILD      CBD ? Y
JATED SIGNAL

--------------------------------------------------------------------------------


                  C A P A C I T Y   A N A L Y S I S

  LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW               GREEN    LN GR    V/C
   MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
   ---     ----  -------  ------  -----    ------    -----  --------  -----
   LTR      489       0     1340  0.365      Y       0.529       709  0.690




   TR       213       0     1613  0.132      Y       0.392       633  0.336


   LT       151       0     1562  0.097      N       0.392       613  0.246

.E LENGTH :   102.0            SUM OF CRITICAL LANES' FLOW RATIOS : 0.497
; TIME PER CYCLE :    6        INTERSECTION V/C : 0.528

--------------------------------------------------------------------------------
                    L E V E L   O F   S E R V I C E

  LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
   MVM  RATIO RATIO   LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
   ---  ----- -----   ---  -----  ---   -----   --    -----  ---   ----- ---
    LTR  0.690 0.529  102   13.5   709    2.0  0.85    13.2   B     13.1  B




    TR   0.336 0.392  102   16.5   633    0.1  0.85    14.1   B     14.0  B


    LT   0.246 0.392  102   15.8   613    0.0  0.85    13.4   B     13.2  B



                                      INTERSECTION DELAY : 13.3 secs/veh
                                      LEVEL OF SERVICE : B
```

```
                                    HMM ASSOCIATES                                       6/6/1988

                                      1752-119                                           I1PMNB
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   PM PEAK           1992 NO BUILD      CBD?Y
ACTUATED SIGNAL
-------------------------------------------------------------------------------
             T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
      GRADE    HV    ADJ. PKG LN.   BUSES         CONF. PEDS   PED BUTTON    ARR
APP    (%)     (%)    Y/N    Nm      (Nb)    PHF   (peds/hr)    Y/N   SEC    TYPE
---   -----    ---   ---------       ----    ----  ----------   ----------   ----
 EB     0       2      N      0       0      0.90       0        N    0.0      3
 WB     0       2      N      0       0      0.90       0        N    0.0      3
 NB     0       2      N      0       0      0.90       0        N    0.0      3
 SB     0       2      N      0       0      0.90       0        N    0.0      3


-------------------------------------------------------------------------------
                         G E O M E T R I C S  /  V O L U M E S
                                               LANE GROUPS
             VOLUME                  1                   2                   3
  APP   LT     TH     RT     MVM    LNS    WD    MVM    LNS    WD    MVM    LNS    WD
  ---   ---------------      ---------------     ---------------     ---------------
   EB   324    202    120    LTR     1    16.0
   WB     0      0      0
   NB     0    247     40    TR      1    14.0
   SB    70    246      0    LT      1    14.0


-------------------------------------------------------------------------------
                           S I G N A L   P H A S I N G
  APP    PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV       G     Y+R
  ---    -----    ------    ------    ------    ----     ----       --    ---
   EB      1       LTR                                    LP        54     46
   NB      2       TR                                     R         40     62
   SB      2       LT                                     L         40     62
```

```
E 1                          HMM ASSOCIATES                        6/6/1988

                               1752-119                             I1PMNB
ERSECTION :
TER @
LSEA
KDAY   PM PEAK          1992 NO BUILD     CBD ? Y
UATED SIGNAL

--------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

ROACH   LANE GROUP    FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
        MVM  VOLUME    IN GROUP    FACTOR         RATE         LT     RT
-----   ---  ------    --------    ------         ----        ----   ----
        LTR   646        718        1.00          718         0.50   0.19



        TR    287        319        1.00          319         0.00   0.14


        LT    316        351        1.00          351         0.22   0.00



--------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
 MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT    FLOW
 --- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
 LTR   1800     1     1.13  0.99  1.00  1.00  1.00  1.00  0.88  0.83   1471



 TR    1800     1     1.07  0.99  1.00  1.00  1.00  1.00  0.91  1.00   1735


 LT    1800     1     1.07  0.99  1.00  1.00  1.00  1.00  1.00  0.79   1506
```

```
                                       1732-119                          I1PMNB
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   PM PEAK             1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------

                      C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW                GREEN   LN GR    V/C
APP   MVM     RATE  LT FLOW  FLW RT  RATIO   CRIT ?    RATIO  CAPACITY  RATIO
---   ---     ----  -------  ------  -----   ------    -----  --------  -----
EB    LTR      718        0    1471  0.488     Y       0.529       779  0.922


WB


NB    TR       319        0    1735  0.184     N       0.392       680  0.469


SB    LT       351        0    1506  0.233     Y       0.392       591  0.594

CYCLE LENGTH :    102.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.721
LOSS TIME PER CYCLE :     6         INTERSECTION V/C : 0.766

--------------------------------------------------------------------------------
                        L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP   MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS  DELAY LOS
---   ---   ----- -----  ---  -----  ---   -----    --    -----  ---  ----- ---
EB     LTR  0.922 0.529  102   16.8   779   11.8  0.85     24.3   C     24.2  C


WB


NB     TR   0.469 0.392  102   17.5   680    0.4  0.85     15.2   C     15.1  C


SB     LT   0.594 0.392  102   18.7   591    1.2  0.85     16.9   C     16.8  C



                                  INTERSECTION DELAY : 20.2 secs/veh
                                  LEVEL OF SERVICE : C
```

```
                         HMM ASSOCIATES                                 6/6/1988

                          . 1752-119                                     I2AMNB
RSECTION :
TER @
ANS
DAY   AM PEAK           1992 NO BUILD     CBD?Y
ATED SIGNAL
-------------------------------------------------------------------------------
      T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
   GRADE    HV     ADJ. PKG LN.   BUSES          CONF. PEDS   PED BUTTON    ARR
    (%)     (%)     Y/N   Nm      (Nb)    PHF    (peds/hr)    Y/N   SEC    TYPE
   -----    ---    ---------      ----    ----   ----------   ----------   ----
     0       2      N     0        0      0.90       0         N    0.0      3
     0       2      N     0        0      0.90       0         N    0.0      3
     0       2      N     0        0      0.90       0         N    0.0      3
     0       2      N     0        0      0.90       0         N    0.0      3


-------------------------------------------------------------------------------
                  G E O M E T R I C S  /  V O L U M E S
                                             LANE GROUPS
        VOLUME                   1                    2                   3
   LT      TH     RT      MVM    LNS    WD      MVM    LNS    WD      MVM    LNS    WD
   ----------------      ----------------      ----------------      ----------------
B   54      80     73     LTR      1    16.0
B   44      42      4     LTR      1    16.0
B   46       5     30     LTR      1    12.0
B    4      11     24     LTR      1     9.0


-------------------------------------------------------------------------------
                    S I G N A L   P H A S I N G
     PHASE    1ST MV    2ND MV    3RD MV    PROT       PMSV        G        Y+R
     -----    ------    ------    ------    ----       ----        --       ---
B      1        LTR                                     LR         40        33
B      1        LTR                                     LR         40        33
B      2        LTR                                     LR         25        48
B      2        LTR                                     LR         25        48
```

```
                                       1752-119                               12AMNB
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   AM PEAK           1992 NO BUILD      CBD ? Y
ACTUATED SIGNAL

---------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH   LANE  GROUP    FLOW RATE   LANE UTIL    ADJ FLOW     PROP OF TURNS
           MVM   VOLUME    IN GROUP    FACTOR        RATE        LT      RT
--------   ---   ------    --------    ------        ----       ----    ----
EB         LTR    207        230        1.00          230       0.26    0.35


WB         LTR     90        100        1.00          100       0.49    0.04


NB         LTR     81         90        1.00           90       0.57    0.37


SB         LTR     39         43        1.00           43       0.10    0.62



---------------------------------------------------------------------------------
                        S A T U R A T I O N    F L O W

           IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------    ADJ.
APP MVM  SAT FLOW  LANES   WIDTH  H.V.  GRADE  PARK   BUS   AREA   RT    LT    FLOW
--- ---  --------  -----   -----  ----  -----  ----   ----  ----  ----  ----   ----
EB  LTR    1800      1      1.13  0.99  1.00   1.00   1.00  0.90  0.85  0.98   1510


WB  LTR    1800      1      1.13  0.99  1.00   1.00   1.00  0.90  0.97  0.86   1512


NB  LTR    1800      1      1.00  0.99  1.00   1.00   1.00  0.90  0.85  0.96   1309


SB  LTR    1800      1      0.90  0.99  1.00   1.00   1.00  0.90  0.82  1.00   1184
```

```
E 2                           HMM ASSOCIATES                      6/6/1988

                                 1752-119                            12AMNB
ERSECTION :
TER @
EANS
KDAY   AM PEAK           1992 NO BUILD     CBD ? Y
JATED SIGNAL

-----------------------------------------------------------------------------


                   C A P A C I T Y   A N A L Y S I S

  LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW              GREEN    LN GR    V/C
   MVM    RATE   LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
   ---    ----   -------  ------  -----    ------    -----  --------  -----
   LTR     230         0    1510  0.152       Y      0.548       827  0.278


   LTR     100         0    1512  0.066       N      0.548       828  0.121


   LTR      90         0    1309  0.069       Y      0.342       448  0.201


   LTR      43         0    1184  0.036       N      0.342       405  0.106


LE LENGTH :     73.0            SUM OF CRITICAL LANES' FLOW RATIOS : 0.221
S TIME PER CYCLE :     6        INTERSECTION V/C : 0.241

-----------------------------------------------------------------------------
                    L E V E L   O F   S E R V I C E

  LN GR    V/C  GREEN  CYC   1st  LN GR   2nd           LN GR LN GR   APP  APP
   MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
   ---   ----- -----  ---  -----  ---   -----    --    -----  ---   ----- ---
    LTR  0.278 0.548   73    6.7   827    0.0  0.85      5.7   B      5.7  B


    LTR  0.121 0.548   73    6.1   828    0.0  0.85      5.2   B      5.1  B


    LTR  0.201 0.342   73   12.9   448    0.0  0.85     11.0   B     10.8  B


    LTR  0.106 0.342   73   12.4   405    0.0  0.85     10.3   B     10.0  B



                                     INTERSECTION DELAY :  7.0 secs/veh
                                     LEVEL OF SERVICE : B
```

```
                                  HMM ASSOCIATES                              6/6/1988

                                     1752-119                                  12PMNB
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   PM PEAK             1992 NO BUILD      CBD?Y
ACTUATED SIGNAL
------------------------------------------------------------------------------------
           T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
       GRADE    HV    ADJ. PKG LN.  BUSES            CONF. PEDS    PED BUTTON    ARR
 APP    (%)    (%)     Y/N    Nm     (Nb)     PHF    (peds/hr)     Y/N    SEC    TYPE
 ---   -----   ---    ---------     ----     ----   ----------    ----------    ----
  EB     0      2      N      0       0      0.90       0           N     0.0      3
  WB     0      2      N      0       0      0.90       0           N     0.0      3
  NB     0      2      N      0       0      0.90       0           N     0.0      3
  SB     0      2      N      0       0      0.90       0           N     0.0      3


------------------------------------------------------------------------------------
                     G E O M E T R I C S  /  V O L U M E S
                                                LANE GROUPS
            VOLUME                 1                  2                    3
  APP   LT     TH     RT     MVM   LNS    WD     MVM   LNS    WD     MVM   LNS    WD
  ---   ----------------     ----------------    ----------------    ----------------
   EB    16    187     73    LTR    1    16.0
   WB    36     37      4    LTR    1    16.0
   NB    82      7     19    LTR    1    12.0
   SB     4      7     22    LTR    1     9.0


------------------------------------------------------------------------------------
                        S I G N A L   P H A S I N G
  APP    PHASE     1ST MV     2ND MV     3RD MV     PROT      PMSV       G      Y+R
  ---    -----     ------     ------     ------     ----      ----      --      ---
   EB      1        LTR                                        LR       40       33
   WB      1        LTR                                        LR       40       33
   NB      2        LTR                                        LR       25       48
   SB      2        LTR                                        LR       25       48
```

```
E 1                          HMM ASSOCIATES                          6/6/1988

                                1752-119                             12PMNB
ERSECTION :
TER @
EANS
KDAY   PM PEAK          1992 NO BUILD     CBD ? Y
JATED SIGNAL

-----------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

ROACH   LANE GROUP    FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
        MVM   VOLUME   IN GROUP    FACTOR        RATE          LT      RT
-----   ---   ------   --------    ------        ----         ----    ----
        LTR    276        307       1.00          307          0.06    0.26


        LTR     97        108       1.00          108          0.37    0.04


        LTR    108        120       1.00          120          0.76    0.18


        LTR     33         37       1.00           37          0.12    0.66



-----------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

      IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
 MVM SAT FLOW LANES  WIDTH  H.V.  GRADE  PARK   BUS   AREA   RT    LT   FLOW
 --- -------- -----  -----  ----  -----  ----  ----  ----  ----  ----  ----
 LTR   1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.86  1.00  1559


 LTR   1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.97  0.82  1441


 LTR   1800     1     1.00  0.99  1.00  1.00  1.00  0.90  0.89  0.93  1327


 LTR   1800     1     0.90  0.99  1.00  1.00  1.00  0.90  0.81  1.00  1169
```

```
                                         1752-119                                  I2PMNB
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   PM PEAK              1992 NO BUILD      CBD ? Y
ACTUATED SIGNAL

-----------------------------------------------------------------------------------

                        C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW                  GREEN    LN GR     V/C
APP   MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?       RATIO  CAPACITY  RATIO
---   ---     ----  -------  ------  -----    ------       -----  --------  -----
EB    LTR      307        0    1559  0.197      Y          0.548       854  0.359


WB    LTR      106        0    1441  0.075      N          0.548       790  0.137


NB    LTR      120        0    1327  0.090      Y          0.342       454  0.264


SB    LTR       37        0    1169  0.032      N          0.342       400  0.092

CYCLE LENGTH :     73.0              SUM OF CRITICAL LANES' FLOW RATIOS : 0.287
LOSS TIME PER CYCLE :     6          INTERSECTION V/C : 0.313

-----------------------------------------------------------------------------------
                         L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN   CYC   1st  LN GR   2nd          LN GR LN GR    APP  APP
APP   MVM   RATIO RATIO   LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
---   ---   ----- -----   ---  -----  ---   -----    --    -----  ---   ----- ---
EB     LTR  0.359 0.548    73    7.1   854    0.1  0.85      6.1   B      6.1  B


WB     LTR  0.137 0.548    73    6.1   790    0.0  0.85      5.2   B      5.1  B


NB     LTR  0.264 0.342    73   13.2   454    0.1  0.85     11.3   B     11.1  B


SB     LTR  0.092 0.342    73   12.4   400    0.0  0.85     10.5   B     10.0  B



                                        INTERSECTION DELAY :  7.2 secs/veh
                                        LEVEL OF SERVICE : B
                         HMM ASSOCIATES                              6/6/1988

                              1752-119                               I3AMNB
ERSECTION :
NER @
IDIAN
KDAY    AM PEAK           1992 NO BUILD     CBD?Y
UATED SIGNAL
-------------------------------------------------------------------------------
       T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
    GRADE    HV     ADJ. PKG LN.  BUSES          CONF. PEDS   PED BUTTON    ARR
P    (%)    (%)      Y/N   Nm      (Nb)   PHF    (peds/hr)    Y/N   SEC     TYPE
-   -----   ---     ---------     ----    ----   ----------   ----------    ----
B     0      2       N     0        0     0.90       0         N    0.0      3
B     0      2       N     0        0     0.90       0         N    0.0      3
B     0      2       N     0        0     0.90       0         N    0.0      3


-------------------------------------------------------------------------------
                 G E O M E T R I C S  /  V O L U M E S
                                              LANE GROUPS
         VOLUME                1                   2                   3
P    LT     TH     RT     MVM    LNS    WD     MVM    LNS    WD     MVM    LNS    WD
--  ---------------      ----------------     ----------------    ----------------
EB   111     90      0    LT      1    16.0
WB     0     84    314    T       1    16.0    R       1    13.0
SB     0      0     10    R       1     8.0


-------------------------------------------------------------------------------
                   S I G N A L   P H A S I N G
P     PHASE     1ST MV     2ND MV     3RD MV     PROT      PMSV        G       Y+R
--    -----     ------     ------     ------     ----      ----        --      ---
EB      1         LT                                        L          20       50
WB      1         T          R                              R          20       50
SB      2         R                                         R          25       45
```

```
                                  1752-119                                I3AMNB
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   AM PEAK          1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

-------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
           MVM  VOLUME   IN GROUP     FACTOR       RATE        LT      RT
--------   ---  ------   ---------    ------       ----       ----    ----
EB         LT    201        223        1.00         223        0.55    0.00


WB         T      84         93        1.00          93        0.00    0.00
           R     314        349        1.00         349        0.00    1.00

SB         R      10         11        1.00          11        0.00    1.00



-------------------------------------------------------------------------------
                        S A T U R A T I O N   F L O W

          IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM SAT FLOW LANES   WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- --- -------- -----   -----  ---- -----  ----  ---- ----  ----  ----    ----
EB  LT    1800     1      1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.67   1214


WB  T     1800     1      1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812
    R     1800     1      1.03  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1404

SB  R     1800     1      0.87  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1166
```

```
E 2                           HMM ASSOCIATES                         6/6/1988

                                 1752-119                             13AMNB
ERSECTION :
NER @
IDIAN
KDAY   AM PEAK            1992 NO BUILD     CBD ? Y
JATED SIGNAL

---------------------------------------------------------------------------

                  C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW             GREEN    LN GR    V/C
  MVM    RATE   LT FLOW  FLW RT  RATIO    CRIT ?  RATIO  CAPACITY  RATIO
  ---    ----   -------  ------  -----    ------  -----  --------  -----
  LT      223        0     1214  0.184      N     0.286       347  0.643


  T        93        0     1812  0.051      N     0.286       518  0.180
  R       349        0     1404  0.249      Y     0.286       401  0.870

  R        11        0     1186  0.009      Y     0.357       424  0.026

LE LENGTH :    70.0           SUM OF CRITICAL LANES' FLOW RATIOS : 0.258
S TIME PER CYCLE :    6       INTERSECTION V/C : 0.282

---------------------------------------------------------------------------
                   L E V E L   O F   S E R V I C E

 LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR    APP  APP
  MVM   RATIO RATIO   LEN  DELAY  CAP   DELAY   PF    DELAY  LOS    DELAY LOS
  ---   ----- -----   ---  -----  ---   -----   --    -----  ---    ----- ---
   LT   0.643 0.286    70   16.6   347    2.8  0.85    16.5   C      16.4  C


   T    0.180 0.286    70   14.3   518    0.0  0.85    12.2   B
   R    0.870 0.286    70   18.1   401   12.7  0.85    26.2   D      23.2  C

   R    0.026 0.357    70   11.1   424    0.0  0.85     9.4   B       8.0  B



                                    INTERSECTION DELAY : 20.6 secs/veh
                                    LEVEL OF SERVICE : C
                                 HMM ASSOCIATES                     6/5/1988

                                    1752-119                           I3PMNB
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   PM PEAK           1992 NO BUILD     CBD?Y
ACTUATED SIGNAL
--------------------------------------------------------------------------------
           T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
       GRADE    HV    ADJ. PKG LN.   BUSES         CONF. PEDS    PED BUTTON    ARR
 APP    (%)    (%)     Y/N   Nm       (Nb)   PHF   (peds/hr)     Y/N   SEC     TYPE
 ---   -----   ---    ---------      ----   ----   ----------    ----------    ----
  EB     0      2       N     0        0    0.90       0          N    0.0       3
  WB     0      2       N     0        0    0.90       0          N    0.0       3
  SB     0      2       N     0        0    0.90       0          N    0.0       3


--------------------------------------------------------------------------------
                      G E O M E T R I C S  /  V O L U M E S
                                               LANE GROUPS
              VOLUME                1                  2                  3
  APP   LT     TH     RT     MVM    LNS    WD     MVM    LNS    WD     MVM    LNS    WD
  ---   ---------------      ---------------      ---------------      ---------------
   EB  101     93      0     LT      1   16.0
   WB    0     88    306     T       1   16.0     R       1   13.0
   SB    0      0     10     R       1    8.0


--------------------------------------------------------------------------------
                          S I G N A L   P H A S I N G
  APP    PHASE    1ST MV    2ND MV    3RD MV    PROT      PMSV        G      Y+R
  ---    -----    ------    ------    ------    ----      ----        --     ---
   EB      1        LT                                      L         20      50
   WB      1        T         R                             R         20      50
   SB      2        R                                       R         25      45
```

```
E 1                              HMM ASSOCIATES                       6/6/1988

                                   1752-119                            I3PMNB
ERSECTION :
NER @
IDIAN
KDAY   PM PEAK           1992 NO BUILD     CBD ? Y
UATED SIGNAL

------------------------------------------------------------------------------
                     V O L U M E   A D J U S T M E N T

ROACH    LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
         MVM   VOLUME   IN GROUP    FACTOR        RATE        LT     RT
-----    ---   ------   --------    ------        ----       ----   ----
         LT     194       216        1.00         216        0.52   0.00


         T       88        98        1.00          98        0.00   0.00
         R      306       340        1.00         340        0.00   1.00

         R       10        11        1.00          11        0.00   1.00



------------------------------------------------------------------------------
                     S A T U R A T I O N   F L O W

 .   IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
 MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT    FLOW
 --- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
 LT    1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.69   1250


 T     1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812
 R     1800     1     1.03  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1404

 R     1800     1     0.87  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1186
```

```
PAGE 2                              HMM ASSOCIATES                              6/6/1988

                                       1752-119                                   I3PMNE
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   PM PEAK              1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------

                        C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW              GREEN    LN GR    V/C
APP   MVM     RATE  LT FLOW  FLW RT  RATIO   CRIT ?    RATIO  CAPACITY  RATIO
---   ---     ----  -------  ------  -----   ------    -----  --------  -----
EB    LT       216        0    1250  0.173      N      0.286       357  0.605


WB     T        98        0    1812  0.054      N      0.286       518  0.189
       R       340        0    1404  0.242      Y      0.286       401  0.848

SB     R        11        0    1186  0.009      Y      0.357       424  0.026


CYCLE LENGTH :     70.0              SUM OF CRITICAL LANES' FLOW RATIOS : 0.251
LOSS TIME PER CYCLE :     6          INTERSECTION V/C : 0.275

--------------------------------------------------------------------------------
                         L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP   MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS  DELAY LOS
---   ---   ----- -----  ---  -----  ---   -----    --    -----  ---  ----- ---
EB     LT   0.605 0.286   70   16.4  357     2.1  0.85     15.7   C    15.6  C


WB      T   0.189 0.286   70   14.3  518     0.0  0.85     12.2   B
        R   0.848 0.286   70   17.9  401    10.8  0.85     24.4   C    21.6  C

SB      R   0.026 0.357   70   11.1  424     0.0  0.85      9.4   B     8.0  B



                                          INTERSECTION DELAY : 19.3 secs/veh
                                          LEVEL OF SERVICE : C
```

```
                                   HMM ASSOCIATES                                    6/6/1988

                                        1752-119                                     I4AMNB
ERSECTION :
TER @
MAN          AM
KDAY       ~~PM~~ PEAK              1992 NO BUILD        CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

------------------------------------------------------------------------------------------

NSIGNALIZED CRITICAL GAPS

              -----------CRITICAL GAPS (SEC)----------
 APP          LEFT TURN        THROUGH         RIGHT TURN
 ---          ---------        -------         ----------

 EB              5.00            ---              ---

 WB              5.00            ---              ---

 NB              6.50            6.00             5.50

 SB              6.50            6.00             5.50

------------------------------------------------------------------------------------------

     VOLUME ALLOCATION TO LANES

            LANE 1              LANE 2              LANE 3
P         L     T     R      L     T     R      L     T     R
--      ---------------    ---------------    ---------------

B        51     0     0      0   148    35      0     0     0
B         7    46    49      0     0     0      0     0     0
B         2    28     0      0     0     0      0     0     0
B        83   208     0      0     0     0      0     0     0

------------------------------------------------------------------------------------------

                      UNSIGNALIZED

P                              LANE 1     LANE 2     LANE 3
--                             -------    -------    -------

B       RESERVE CAPACITY        1039        ---        ---
        LEVEL OF SERVICE         A

B       RESERVE CAPACITY         990        ---        ---
        LEVEL OF SERVICE         A

B       RESERVE CAPACITY         604        ---        ---
        LEVEL OF SERVICE         A

B       RESERVE CAPACITY         362        ---        ---
        LEVEL OF SERVICE         B

OR STREET - EB/WB
```

```
                                HMM ASSOCIATES                          6/6/1988

                                  1752-119                               I4PMNB
INTERSECTION :
PORTER @
BREMAN
WEEKDAY   PM PEAK           1992 NO BUILD      CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

               -----------CRITICAL GAPS (SEC)----------
    APP        LEFT TURN      THROUGH        RIGHT TURN
    ---        ---------      -------        ----------

    EB            5.00          ---             ---

    WB            5.00          ---             ---

    NB            6.50          6.00            5.50

    SB            6.50          6.00            5.50

----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1              LANE 2              LANE 3
  APP       L    T    R        L    T    R        L    T    R
  ---     --------------     --------------     --------------

  EB       40    0    0        0  250   40        0    0    0
  WB        3   94   55        0    0    0        0    0    0
  NB       21  137   11        0    0    0        0    0    0
  SB      100  183    0        0    0    0        0    0    0

----------------------------------------------------------------------------

                       U N S I G N A L I Z E D

  APP                                LANE 1    LANE 2    LANE 3
  ---                                -------   -------   -------

  EB      RESERVE CAPACITY            992        ---       ---
          LEVEL OF SERVICE             A

  WB      RESERVE CAPACITY            889        ---       ---
          LEVEL OF SERVICE             A

  NB    . RESERVE CAPACITY            346        ---       ---
          LEVEL OF SERVICE             B

  SB      RESERVE CAPACITY            189        ---       ---
          LEVEL OF SERVICE             D

 MAJOR STREET - EB/WB
```

```
                                  HMM ASSOCIATES                        6/6/1988

                                     1752-119                            ISAMNB
ERSECTION :
ERICK @
IDIAN
KDAY   AM PEAK             1992 NO BUILD     CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

------------------------------------------------------------------------------

UNSIGNALIZED  CRITICAL  GAPS

           -----------CRITICAL GAPS (SEC)----------
 APP       LEFT TURN       THROUGH       RIGHT TURN
 ---       ---------       -------       ----------

 EB           5.00           ---            ---

 WB           5.00           ---            ---

 NB           6.00           5.50           5.00

 SB           6.00           5.50           5.00

------------------------------------------------------------------------------

    VOLUME  ALLOCATION  TO  LANES

          LANE 1            LANE 2            LANE 3
PP      L    T    R       L    T    R       L    T    R
--    --------------    --------------    --------------

B         0    1    0       0    0    0       0    0    0
B         0   61    0       0    0  235       0    0    0
B        29    0    0       0  339   80       0    0    0
B       291    0   25       0    0    0       0    0    0

------------------------------------------------------------------------------

                   UNSIGNALIZED

PP                         LANE 1    LANE 2    LANE 3
--                         -------   -------   -------

B      RESERVE CAPACITY      ---       ---       ---
       LEVEL OF SERVICE

B      RESERVE CAPACITY      ---       ---       ---
       LEVEL OF SERVICE

B      RESERVE CAPACITY      870       419       ---
       LEVEL OF SERVICE       A         A

B      RESERVE CAPACITY       55       ---       ---
       LEVEL OF SERVICE       E

OR STREET - EB/WB
```

```
                                   HMM ASSOCIATES                            6/6/1988

                                      1752-119                                ISPMNB
INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY   PM PEAK            1992 NO BUILD     CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-------------------------------------------------------------------------------

   UNSIGNALIZED  CRITICAL  GAPS

                -----------CRITICAL GAPS (SEC)----------
    APP         LEFT TURN       THROUGH        RIGHT TURN
    ---         ---------       -------        ----------

    EB             5.00           ---             ---

    WB             5.00           ---             ---

    NB             5.75          5.00            5.00

    SB             5.75          5.00            5.00

-------------------------------------------------------------------------------

        VOLUME  ALLOCATION  TO  LANES

               LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---      --------------    --------------    --------------

  EB         0    1    0       0    0    0       0    0    0
  WB         0   46    0       0    0  357       0    0    0
  NB        22    0    0       0  312  144       0    0    0
  SB       334    0   50       0    0    0       0    0    0

-------------------------------------------------------------------------------

                        UNSIGNALIZED

  APP                              LANE 1    LANE 2    LANE 3
  ---                              -------   -------   -------

  EB      RESERVE CAPACITY           ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY           ---       ---       ---
          LEVEL OF SERVICE

  NB      RESERVE CAPACITY           853       423       ---
          LEVEL OF SERVICE            A         A

  SB      RESERVE CAPACITY           -7        ---       ---
          LEVEL OF SERVICE         FAILURE

  MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                        6/6/1988

                                 1752-119                            I6AMNB
ERSECTION :
ERICK @
EANS
KDAY   AM PEAK          1992 NO BUILD     CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------

UNSIGNALIZED CRITICAL GAPS

          -----------CRITICAL GAPS (SEC)----------
 APP      LEFT TURN       THROUGH       RIGHT TURN
 ---      ---------       -------       ----------

 EB          5.00           ---            ---

 WB          5.00           ---            ---

 NB          6.50           6.00           5.50

 SB          6.50           6.00           5.50


----------------------------------------------------------------------------

    VOLUME  ALLOCATION  TO  LANES

         LANE 1           LANE 2           LANE 3
PP      L    T    R      L    T    R      L    T    R
--     --------------   --------------   --------------

B       0    0   10      0    0    0      0    0    0
B      25    0    0      0  333    3      0    0    0
B      73   71    0      0    0    0      0    0    0
B       0   51   15      0    0    0      0    0    0

----------------------------------------------------------------------------

                   UNSIGNALIZED

PP                          LANE 1    LANE 2    LANE 3
--                          -------   -------   -------

B      RESERVE CAPACITY       ---       ---       ---
       LEVEL OF SERVICE

B      RESERVE CAPACITY      1163       ---       ---
       LEVEL OF SERVICE        A

B      RESERVE CAPACITY       423       ---       ---
       LEVEL OF SERVICE        A

B      RESERVE CAPACITY       594       ---       ---
       LEVEL OF SERVICE        A

OR STREET - EB/WB
```

```
                              HMM ASSOCIATES                     5/6/1988

                                 1752-119                          I6PMNB
INTERSECTION :
MAVERICK @
ORLEANS
WEEKDAY   PM PEAK           1992 NO BUILD     CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------

  U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
   APP       LEFT TURN      THROUGH      RIGHT TURN
   ---       ---------      -------      ----------

   EB           5.00          ---           ---

   WB           5.00          ---           ---

   NB           6.50          6.00          5.50

   SB           6.50          6.00          5.50

-----------------------------------------------------------------------

       V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1           LANE 2           LANE 3
 APP        L    T    R      L    T    R      L    T    R
 ---      --------------   --------------   --------------

 EB         0    0   10      0    0    0      0    0    0
 WB        32    0    0      0  362   16      0    0    0
 NB       120   78    0      0    0    0      0    0    0
 SB         0   38   41      0    0    0      0    0    0

-----------------------------------------------------------------------

                      U N S I G N A L I Z E D

 APP                            LANE 1    LANE 2    LANE 3
 ---                            -------   -------   -------

 EB        RESERVE CAPACITY       ---       ---       ---
           LEVEL OF SERVICE

 WB        RESERVE CAPACITY      1155       ---       ---
           LEVEL OF SERVICE        A

 NB        RESERVE CAPACITY       313       ---       ---
           LEVEL OF SERVICE        B

 SB        RESERVE CAPACITY       579       ---       ---
           LEVEL OF SERVICE        A

MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                          5/27/1988

                                  1752-119                              I7AMNB
RSECTION :
RICK @
AGE
DAY   AM PEAK           1992 NO BUILD     CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN        THROUGH       RIGHT TURN
---       ---------        -------       ----------

EB           5.00            ---            ---

WB           5.00            ---            ---

NB           6.50           6.00           5.50

SB           6.50           6.00           5.50

--------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1            LANE 2            LANE 3
P      L    T    R      L    T    R      L    T    R
-     --------------   --------------   --------------

       0    0   10      0    0    0      0    0    0
      19  296    0      0    0    0      0    0    0
       0    0   10      0    0    0      0    0    0
       0   34   34      0    0    0      0    0    0

--------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1    LANE 2    LANE 3
-                          -------   -------   -------

      RESERVE CAPACITY       ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      1169       ---       ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY      1083       ---       ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       660       ---       ---
      LEVEL OF SERVICE        A

R STREET - EB/WB
```

```
                                   HMM ASSOCIATES                            5/27/1988

                                     1752-119                                 I7PMNB
INTERSECTION :
MAVERICK @
COTTAGE
WEEKDAY   PM PEAK             1992 NO BUILD     CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   UNSIGNALIZED  CRITICAL  GAPS

                ----------CRITICAL GAPS (SEC)----------
    APP         LEFT TURN      THROUGH       RIGHT TURN
    ---         ---------      -------       ----------

    EB             5.00          ---            ---

    WB             5.00          ---            ---

    NB             6.50          6.00           5.50

    SB             6.50          6.00           5.50

-----------------------------------------------------------------------------

        VOLUME  ALLOCATION  TO  LANES

               LANE 1           LANE 2           LANE 3
  APP        L    T    R      L    T    R      L    T    R
  ---      --------------   --------------   --------------

  EB         0    0   10      0    0    0      0    0    0
  WB        24  329    0      0    0    0      0    0    0
  NB         0    0   10      0    0    0      0    0    0
  SB         0   69   53      0    0    0      0    0    0
-----------------------------------------------------------------------------

                        UNSIGNALIZED

  APP                           LANE 1   LANE 2   LANE 3
  ---                           -------  -------  -------

  EB       RESERVE CAPACITY       ---      ---      ---
           LEVEL OF SERVICE

  WB       RESERVE CAPACITY      1164      ---      ---
           LEVEL OF SERVICE        A

  NB       RESERVE CAPACITY      1083      ---      ---
           LEVEL OF SERVICE        A

  SB       RESERVE CAPACITY       565      ---      ---
           LEVEL OF SERVICE        A

MAJOR STREET - EB/WB
```

```
                           HMM ASSOCIATES                          6/6/1988

                               1752-119                             I8AMNB
ERSECTION :
NER @
MAN
KDAY   AM PEAK            1992 NO BUILD      CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
 APP      LEFT TURN        THROUGH        RIGHT TURN
 ---      ---------        -------        ----------

 EB          5.00            ---             ---

 WB          5.00            ---             ---

 NB          6.50            6.00            5.50

 SB          6.50            6.00            5.50

-----------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1            LANE 2            LANE 3
P      L    T    R      L    T    R      L    T    R
-     --------------   --------------   --------------

B      29  307   48     0    0    0      0    0    0
B       1  114   14     0    0    0      0    0    0
B      38   70   16     0    0    0      0    0    0
B      66   25   46     0    0    0      0    0    0

-----------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1    LANE 2    LANE 3
-                          -------   -------   -------

B      RESERVE CAPACITY     1026       ---       ---
       LEVEL OF SERVICE       A

B      RESERVE CAPACITY      831       ---       ---
       LEVEL OF SERVICE       A

B      RESERVE CAPACITY      396       ---       ---
       LEVEL OF SERVICE       B

B      RESERVE CAPACITY      381       ---       ---
       LEVEL OF SERVICE       B

OR STREET - EB/WB
```

```
                                   HMM ASSOCIATES                           6/6/1988

                                      1752-119                              18PMNB
INTERSECTION :
SUMNER @
BREMAN
WEEKDAY   PM PEAK           1992 NO BUILD     CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

           -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN      THROUGH      RIGHT TURN
    ---      ---------      -------      ----------

    EB          5.00          ---           ---

    WB          5.00          ---           ---

    NB          6.50          6.00          5.50

    SB          6.50          6.00          5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1           LANE 2           LANE 3
  APP       L    T    R      L    T    R      L    T    R
  ---     --------------   --------------   --------------

  EB       25  375   67      0    0    0      0    0    0
  WB        1  103   14      0    0    0      0    0    0
  NB       27   60   34      0    0    0      0    0    0
  SB       94   20   17      0    0    0      0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                             LANE 1    LANE 2    LANE 3
  ---                             -------   -------   -------

  EB      RESERVE CAPACITY         1042       ---       ---
          LEVEL OF SERVICE           A

  WB      RESERVE CAPACITY          756       ---       ---
          LEVEL OF SERVICE           A

  NB      RESERVE CAPACITY          400       ---       ---
          LEVEL OF SERVICE           A

  SB      RESERVE CAPACITY          261       ---       ---
          LEVEL OF SERVICE           C

 MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                         6/6/1988

                                 1752-119                            I9AMNB
RSECTION :
ER @
ANS
DAY   AM PEAK            1992 NO BUILD      CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------

NSIGNALIZED CRITICAL GAPS

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           6.00           5.50           5.00

SB           6.00           5.50           5.00


--------------------------------------------------------------------------

    VOLUME ALLOCATION TO LANES

         LANE 1           LANE 2           LANE 3
P      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

       55  182  105     0    0    0      0    0    0
        0    0   10     0    0    0      0    0    0
      130  106   16     0    0    0      0    0    0
       30   35    4     0    0    0      0    0    0

--------------------------------------------------------------------------

                  UNSIGNALIZED

P                        LANE 1   LANE 2   LANE 3
-                        -------  -------  -------

      RESERVE CAPACITY    1132      ---      ---
      LEVEL OF SERVICE     A

      RESERVE CAPACITY     ---      ---      ---
      LEVEL OF SERVICE

      RESERVE CAPACITY     451      ---      ---
      LEVEL OF SERVICE      A

      RESERVE CAPACITY     555      ---      ---
      LEVEL OF SERVICE      A

R STREET - EB/WB
```

```
INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY   PM PEAK            1992 NO BUILD      CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

                ----------CRITICAL GAPS (SEC)----------
    APP         LEFT TURN       THROUGH       RIGHT TURN
    ---         ---------       -------       ----------

    EB             5.00           ---            ---

    WB             5.00           ---            ---

    NB             6.00           5.50           5.00

    SB             6.00           5.50           5.00

--------------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---      --------------    --------------    --------------

  EB        83  346   73       0    0    0       0    0    0
  WB         0    0   10       0    0    0       0    0    0
  NB       117  164   36       0    0    0       0    0    0
  SB        10   39   10       0    0    0       0    0    0

--------------------------------------------------------------------------------

                         U N S I G N A L I Z E D

  APP                              LANE 1    LANE 2    LANE 3
  ---                              -------   -------   -------

  EB       RESERVE CAPACITY         1104       ---       ---
           LEVEL OF SERVICE          A

  WB       RESERVE CAPACITY         ---        ---       ---
           LEVEL OF SERVICE

  NB       RESERVE CAPACITY          255       ---       ---
           LEVEL OF SERVICE          C

  SB       RESERVE CAPACITY          499       ---       ---
           LEVEL OF SERVICE          A

MAJOR STREET - EB/WB
```

```
RSECTION :
ER @
AGE
DAY   AM PEAK            1992 NO BUILD     CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           6.50           6.00           5.50

SB           6.50           6.00           5.50


----------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1            LANE 2            LANE 3
P      L    T    R      L    T    R      L    T    R
-     --------------   --------------   --------------

        0  201   51      0    0    0      0    0    0
        0    0   10      0    0    0      0    0    0
        0    0   10      0    0    0      0    0    0
       21   22    0      0    0    0      0    0    0

----------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1   LANE 2   LANE 3
-                          -------  -------  -------

      RESERVE CAPACITY       ---      ---      ---
      LEVEL OF SERVICE

      RESERVE CAPACITY       ---      ---      ---
      LEVEL OF SERVICE

      RESERVE CAPACITY       844      ---      ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       660      ---      ---
      LEVEL OF SERVICE        A

R STREET - EB/WB
```

```
                                  HMM ASSOCIATES                     3/6/1988

                                     1752-119                           I10PMNE
INTERSECTION :
SUMNER @
COTTAGE
WEEKDAY   PM PEAK         1992 NO BUILD      CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

              -----------CRITICAL GAPS (SEC)----------
    APP       LEFT TURN       THROUGH        RIGHT TURN
    ---       ---------       -------        ----------

    EB           5.00           ---             ---

    WB           5.00           ---             ---

    NB           6.50           6.00            5.50

    SB           6.50           6.00            5.50

--------------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

             LANE 1           LANE 2           LANE 3
  APP       L    T    R       L    T    R      L    T    R
  ---    --------------    --------------   --------------

  EB        0  334   58       0    0    0      0    0    0
  WB        0    0   10       0    0    0      0    0    0
  NB        0    0   10       0    0    0      0    0    0
  SB       24   30    0       0    0    0      0    0    0

--------------------------------------------------------------------------------

                      U N S I G N A L I Z E D

  APP                         LANE 1    LANE 2    LANE 3
  ---                         -------   -------   -------

  EB      RESERVE CAPACITY      ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY      ---       ---       ---
          LEVEL OF SERVICE

  NB      RESERVE CAPACITY      720       ---       ---
          LEVEL OF SERVICE       A

  SB      RESERVE CAPACITY      535       ---       ---
          LEVEL OF SERVICE       A

MAJOR STREET - EB/WB
```

```
                          HMM ASSOCIATES                          6/6/1988

                             1752-115                              I11AMNB
:RSECTION :
IER @
.SEA
:DAY    AM PEAK             1992 NO BUILD      CBD?Y
IATED SIGNAL
----------------------------------------------------------------------------
       T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
   GRADE    HV     ADJ. PKG LN.   BUSES          CONF. PEDS   PED BUTTON    ARR
'   (%)     (%)     Y/N    Nm      (Nb)    PHF    (peds/hr)   Y/N    SEC    TYPE
.   -----   ---    ---------       ----    ----   ----------  ----------    ----
:     0      2      N      0        0      0.90       0        N     0.0      3
:     0      2      N      0        0      0.90       0        N     0.0      3
:     0      2      N      0        0      0.90       0        N     0.0      3


----------------------------------------------------------------------------
                 G E O M E T R I C S  /  V O L U M E S
                                           LANE GROUPS
        VOLUME                  1                  2                   3
P   LT      TH     RT     MVM    LNS    WD     MVM    LNS    WD     MVM    LNS    WD
-   ---------------      ---------------     ---------------      ---------------
B     0     90      0     T       1    16.0
B     0    194      0     T       2    29.0
B   293      0    205     L       1    16.0    R       1    16.0


----------------------------------------------------------------------------
                   S I G N A L   P H A S I N G
P    PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV       G       Y+R
-    -----    ------    ------    ------    ----     ----       --      ---
B      1        T                                               20       50
IB     1        T                                               20       50
.B     2        L         R                           LR        25       45
```

```
                                   1752-119                            I11AMNB
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   AM PEAK           1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

-------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
           MVM   VOLUME   IN GROUP    FACTOR       RATE         LT      RT
--------   ---   ------   ---------   -------      ----        ----    ----
EB          T      90        100        1.00        100         0.00    0.00


WB          T     194        216        1.05        227         0.00    0.00


SB          L     293        326        1.00        326         1.00    0.00
            R     205        228        1.00        228         0.00    1.00

-------------------------------------------------------------------------------
                        S A T U R A T I O N    F L O W

          IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM SAT FLOW LANES   WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT     FLOW
--- --- -------- -----   -----  ---- -----  ----  ----  ----  ----  ----    ----
EB   T    1800     1      1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00    1812


WB   T    1800     2      1.08  0.99  1.00  1.00  1.00  0.90  1.00  1.00    3464


SB   L    1800     1      1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.85    1540
     R    1800     1      1.13  0.99  1.00  1.00  1.00  0.90  0.85  1.00    1540
```

```
E 2                          HMM ASSOCIATES                      6/6/1988

                                1752-119                             I11AMNB
RSECTION :
ER @
SEA
DAY   AM PEAK             1992 NO BUILD     CBD ? Y
ATED SIGNAL

----------------------------------------------------------------------------


                  C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW             GREEN    LN GR    V/C
  MVM    RATE   LT FLOW  FLW RT  RATIO   CRIT ?   RATIO  CAPACITY  RATIO
  ---    ----   -------  ------  -----   ------   -----  --------  -----
  T       100         0     1812  0.055     N      0.286      518  0.193


  T       227         0     3464  0.066     Y      0.286      990  0.229


  L       326         0     1540  0.212     Y      0.357      550  0.593
  R       228         0     1540  0.148     N      0.357      550  0.415

E LENGTH :    70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.278
 TIME PER CYCLE :    6         INTERSECTION V/C : 0.304

----------------------------------------------------------------------------
                   L E V E L   O F   S E R V I C E

 LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
  MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
  ---   ----- -----  ---  -----  ---   -----   --    -----  ---   ----- ---
   T    0.193 0.286   70   14.4   518    0.0  0.85    12.2   B     12.0  B


   T    0.229 0.286   70   14.5   990    0.0  0.85    12.3   B     12.2  B


   L    0.593 0.357   70   13.9   550    1.3  0.85    12.9   B
   R    0.415 0.357   70   12.9   550    0.3  0.85    11.2   B     12.2  B


                                    INTERSECTION DELAY : 12.1 secs/veh
                                    LEVEL OF SERVICE : B
```

```
                                     HMM ASSOCIATES                           2/6/1988

                                        1752-119                                I11PMNB
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   PM PEAK          1992 NO BUILD     CBD?Y
ACTUATED SIGNAL
-------------------------------------------------------------------------------
           T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
       GRADE    HV    ADJ. PKG LN.  BUSES         CONF. PEDS   PED BUTTON    ARR
 APP    (%)     (%)    Y/N   Nm      (Nb)   PHF   (peds/hr)    Y/N   SEC     TYPE
 ---   -----    ---   ---------     ----    ----  ----------   ----------    ----
  EB     0       2     N     0       0     0.90       0         N    0.0       3
  WB     0       2     N     0       0     0.90       0         N    0.0       3
  SB     0       2     N     0       0     0.90       0         N    0.0       3


-------------------------------------------------------------------------------
                      G E O M E T R I C S  /  V O L U M E S
                                                LANE GROUPS
              VOLUME                   1                  2                  3
 APP    LT     TH     RT     MVM   LNS    WD     MVM   LNS    WD     MVM   LNS    WD
 ---   ---------------      ---------------      ---------------      ---------------
  EB      0   101      0     T       1   16.0
  WB      0   148      0     T       2   29.0
  SB    353     0    248     L       1   16.0    R       1   16.0


-------------------------------------------------------------------------------
                         S I G N A L   P H A S I N G
 APP    PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV        G      Y+R
 ---    -----    ------    ------    ------    ----     ----        --     ---
  EB      1        T                                                20      50
  WB      1        T                                                20      50
  SB      2        L         R                           LR         25      45
```

```
E 1                            HMM ASSOCIATES                        6/6/1988

                                  1752-119                           I11PMNB
ERSECTION :
NER @
SEA
KDAY   PM PEAK          1992 NO BUILD     CBD ? Y
JATED SIGNAL

------------------------------------------------------------------------------
                  V O L U M E   A D J U S T M E N T

OACH   LANE GROUP    FLOW RATE  LANE UTIL    ADJ FLOW    PROP OF TURNS
       MVM  VOLUME    IN GROUP   FACTOR       RATE        LT     RT
-----  ---  ------    --------   ------       ----       ----   ----
       T     101        112       1.00        112        0.00   0.00


       T     148        164       1.05        172        0.00   0.00


       L     353        392       1.00        392        1.00   0.00
       R     248        276       1.00        276        0.00   1.00


------------------------------------------------------------------------------
                  S A T U R A T I O N   F L O W

     IDEAL   # OF  --------------ADJUSTMENT FACTORS---------------  ADJ.
MVM SAT FLOW LANES WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT   FLOW
--- -------- ----- -----  ---- -----  ----  ----  ----  ----  ----  ----
T     1800     1    1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00  1812


T     1800     2    1.08  0.99  1.00  1.00  1.00  0.90  1.00  1.00  3464


L     1800     1    1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.85  1540
R     1800     1    1.13  0.99  1.00  1.00  1.00  0.90  0.85  1.00  1540
```

```
                                   1752-119                                  I11PMNB
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   PM PEAK           1992 NO BUILD     CBD ? Y
ACTUATED SIGNAL

-----------------------------------------------------------------------------------

                     C A P A C I T Y   A N A L Y S I S

    LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW             GREEN    LN GR     V/C
APP  MVM     RATE   LT FLOW  FLW RT  RATIO    CRIT ?  RATIO  CAPACITY   RATIO
---  ---     ----   -------  ------  -----    ------  -----  --------   -----
EB    T       112        0     1812  0.062       Y    0.286       518   0.216


WB    T       172        0     3464  0.050       N    0.286       990   0.174


SB    L       392        0     1540  0.255       Y    0.357       550   0.713
      R       276        0     1540  0.179       N    0.357       550   0.502

CYCLE LENGTH :     70.0            SUM OF CRITICAL LANES' FLOW RATIOS : 0.317
LOSS TIME PER CYCLE :     6        INTERSECTION V/C : 0.347

-----------------------------------------------------------------------------------
                      L E V E L   O F   S E R V I C E

    LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP  MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
---  ---   ----- -----  ---  -----  ---   -----    --    -----  ---   ----- ---
EB    T    0.216 0.286   70   14.5   518    0.0  0.85     12.3   B     12.1  B


WB    T    0.174 0.286   70   14.3   990    0.0  0.85     12.2   B     12.1  B


SB    L    0.713 0.357   70   14.7   550    3.0  0.85     15.0   B
      R    0.502 0.357   70   13.4   550    0.6  0.85     11.9   B     13.7  B

                                    INTERSECTION DELAY : 13.2 secs/veh
                                    LEVEL OF SERVICE : B
```

```
                                        HMM ASSOCIATES                         6/6/1988

                                            1752-19                              I12AMNB
ERSECTION :
ERICK @
SEA
KDAY   AM PEAK            1992 NO BUILD     CBD?Y
IGNALIZED
MAJOR STREET RUNS EAST / WEST

-------------------------------------------------------------------------------------

JNSIGNALIZED CRITICAL GAPS

            -----------CRITICAL GAPS (SEC)----------
 APP        LEFT TURN        THROUGH       RIGHT TURN
 ---        ---------        -------       ----------

 EB            5.00            ---            ---

 WB            5.00            ---            ---

 NB            0.00            0.00           0.00

 SB            6.50            6.00           5.50

-------------------------------------------------------------------------------------

     VOLUME ALLOCATION TO LANES

          LANE 1             LANE 2             LANE 3
P       L    T    R       L    T    R       L    T    R
--     --------------    --------------    --------------

B        69    0    0       0    0  304       0    0    0
B        55  136    0       0  133  113       0    0    0
B         0    0    0       0    0    0       0    0    0
B         0  139   29       0    0    0       0    0    0

-------------------------------------------------------------------------------------

                    UNSIGNALIZED

P                            LANE 1    LANE 2    LANE 3
--                           -------   -------   -------

B      RESERVE CAPACITY        738       ---       ---
       LEVEL OF SERVICE         A

B      RESERVE CAPACITY        823       ---       ---
       LEVEL OF SERVICE         A

B      RESERVE CAPACITY        ---       ---       ---
       LEVEL OF SERVICE

B      RESERVE CAPACITY        222       ---       ---
       LEVEL OF SERVICE         C

OR STREET - EB/WB
```

```
                                        HMM ASSOCIATES                              6/6/1988

                                                1752-119                              I12PMNB
INTERSECTION :
MAVERICK @
CHELSEA
WEEKDAY   PM PEAK              1992 NO BUILD      CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------------


   U N S I G N A L I Z E D   C R I T I C A L   G A P S

                 -----------CRITICAL GAPS (SEC)----------
    APP          LEFT TURN        THROUGH        RIGHT TURN
    ---          ---------        -------        ----------

    EB              5.00            ---            ---

    WB              5.00            ---            ---

    NB              0.00           0.00           0.00

    SB              6.50           6.00           5.50


--------------------------------------------------------------------------------


        V O L U M E   A L L O C A T I O N   T O   L A N E S

                LANE 1              LANE 2              LANE 3
  APP        L    T    R         L    T    R         L    T    R
  ---       --------------      --------------      --------------

  EB       106    0    0         0    0  370         0    0    0
  WB        61  178    0         0  150  151         0    0    0
  NB         0    0    0         0    0    0         0    0    0
  SB         0  180   73         0    0    0         0    0    0

--------------------------------------------------------------------------------


                         U N S I G N A L I Z E D

  APP                               LANE 1     LANE 2     LANE 3
  ---                               -------    -------    -------

  EB       RESERVE CAPACITY           620        ---        ---
           LEVEL OF SERVICE            A

  WB       RESERVE CAPACITY           757        ---        ---
           LEVEL OF SERVICE            A

  NB       RESERVE CAPACITY           ---        ---        ---
           LEVEL OF SERVICE

  SB       RESERVE CAPACITY            62        ---        ---
           LEVEL OF SERVICE            E

  MAJOR STREET - EB/WB
```

APPENDIX G-5

BUILD CONDITION TRAFFIC ANALYSIS

```
                             HMM ASSOCIATES                     6/6/1988

                                1752-119                           I1AMBD
RSECTION :
ER @
SEA
DAY   AM PEAK            BUILD            CBD?Y
ATED SIGNAL
----------------------------------------------------------------------------
       T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
   GRADE    HV    ADJ. PKG LN.  BUSES         CONF. PEDS   PED BUTTON    ARR
    (%)    (%)     Y/N   Nm      (Nb)   PHF   (peds/hr)    Y/N   SEC     TYPE
   -----   ---    ---------     ----    ----  ----------   ----------    ----

     0      2      N     0        0     0.90      0         N    0.0       3
     0      2      N     0        0     0.90      0         N    0.0       3
     0      2      N     0        0     0.90      0         N    0.0       3
     0      2      N     0        0     0.90      0         N    0.0       3


----------------------------------------------------------------------------
                 G E O M E T R I C S  /  V O L U M E S
                                          LANE GROUPS
        VOLUME                   1                  2                  3
P   LT     TH     RT     MVM   LNS   WD     MVM   LNS   WD     MVM   LNS   WD
-  ---------------     ---------------    ---------------    ---------------
B  152    205    107     LTR    1   16.0
B    0      0      0
B    0    175     18     TR     1   14.0
B   25    115      0     LT     1   14.0


----------------------------------------------------------------------------
                   S I G N A L   P H A S I N G
P    PHASE     1ST MV    2ND MV    3RD MV    PROT     PMSV      G       Y+R
-    -----     ------    ------    ------    ----     ----      --      ---
B      1        LTR                                    LR       54       48
B      2        TR                                     R        40       62
B      2        LT                                     L        40       62
```

```
PAGE 1                              HMM ASSOCIATES                             6/6/1988

                                       1752-119                                  I1AMBD
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   AM PEAK           BUILD                CBD ? Y
ACTUATED SIGNAL

-------------------------------------------------------------------------------
                         V O L U M E   A D J U S T M E N T

APPROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW     PROP OF TURNS
            MVM  VOLUME   IN GROUP    FACTOR       RATE          LT      RT
--------   ---  ------   ---------   ------       ----          ----    ----
EB          LTR    464       516        1.00        516          0.33    0.23


WB


NB          TR     193       214        1.00        214          0.00    0.09


SB          LT     140       156        1.00        156          0.18    0.00


-------------------------------------------------------------------------------
                         S A T U R A T I O N    F L O W

           IDEAL    # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- --- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
EB  LTR   1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.87  0.86   1356


WB


NB  TR    1800     1     1.07  0.99  1.00  1.00  1.00  0.90  0.94  1.00   1613


SB  LT    1800     1     1.07  0.99  1.00  1.00  1.00  0.90  1.00  0.91   1562
```

```
 2                          HMM ASSOCIATES                        6/6/1988

                                1752-119                            I1AMBD
RSECTION :
ER @
SEA
DAY   AM PEAK            BUILD              CBD ? Y
ATED SIGNAL

--------------------------------------------------------------------------

                 C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW               GREEN    LN GR    V/C
  MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
  ---     ----  -------  ------  -----    ------    -----  --------  -----
  LTR      516        0    1356  0.381       Y      0.529       718  0.719




  TR       214        0    1613  0.133       Y      0.392       633  0.338


  LT       156        0    1562  0.100       N      0.392       613  0.254

E LENGTH :   102.0           SUM OF CRITICAL LANES' FLOW RATIOS : 0.514
 TIME PER CYCLE :     6      INTERSECTION V/C : 0.546

--------------------------------------------------------------------------
                  L E V E L   O F   S E R V I C E

 LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
  MVM  RATIO RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
  ---  ----- -----  ---  -----  ---   -----   --    -----  ---   ----- ---
   LTR 0.719 0.529  102   13.9  718     2.4  0.85    13.9   B     13.8  B




   TR  0.338 0.392  102   16.5  633     0.1  0.85    14.1   B     14.0  B


   LT  0.254 0.392  102   15.9  613     0.0  0.85    13.5   B     13.3  B


                                  INTERSECTION DELAY : 13.7 secs/veh
                                  LEVEL OF SERVICE : B
```

```
                                   HMM ASSOCIATES                       5/26/1988

                                      1752-119                            I1PMBD
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   PM PEAK             BUILD              CBD?Y
ACTUATED SIGNAL
-------------------------------------------------------------------------------
            T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
        GRADE    HV     ADJ. PKG LN.  BUSES           CONF. PEDS    PED BUTTON     ARR
 APP     (%)     (%)     Y/N   Nm      (Nb)    PHF    (peds/hr)     Y/N    SEC     TYPE
 ---    -----    ---     ---------     ----    ----   ----------    ----------     ----
  EB      0       2       N     0       0      0.90       0          N     0.0       3
  WB      0       2       N     0       0      0.90       0          N     0.0       3
  NB      0       2       N     0       0      0.90       0          N     0.0       3
  SB      0       2       N     0       0      0.90       0          N     0.0       3


-------------------------------------------------------------------------------
                      G E O M E T R I C S  /  V O L U M E S
                                              LANE GROUPS
             VOLUME                     1                 2                  3
   APP   LT     TH     RT     MVM   LNS   WD       MVM   LNS   WD       MVM   LNS   WD
   ---   --------------       ---------------      ---------------      ---------------
   EB   324    212    125     LTR    1   16.0
   WB     0      0      0
   NB     0    270     40     TR     1   14.0
   SB    71    246      0     LT     1   14.0


-------------------------------------------------------------------------------
                        S I G N A L   P H A S I N G
  APP     PHASE     1ST MV    2ND MV    3RD MV    PROT      PMSV        G      Y+R
  ---     -----     ------    ------    ------    ----      ----        --     ---
   EB       1        LTR                                     LR         54      48
   NB       2        TR                                      R          40      62
   SB       2        LT                                      L          40      62
```

```
                                    1752-119                            I1PMBD
RSECTION :
ER @
SEA
DAY   PM PEAK            BUILD              CBD ? Y
ATED SIGNAL

------------------------------------------------------------------------------
                   V O L U M E   A D J U S T M E N T

OACH    LANE GROUP    FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
      MVM   VOLUME     IN GROUP    FACTOR        RATE          LT      RT
----  ---   ------     --------    ------        ----         ----    ----
      LTR    661         734        1.00         734          0.49    0.19




      TR     310         344        1.00         344          0.00    0.13


      LT     317         352        1.00         352          0.22    0.00


------------------------------------------------------------------------------
                   S A T U R A T I O N   F L O W

    IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT    FLOW
--- -------- -----  -----  ---- -----  ----  ---- ----  ----  ----   ----
LTR   1800     1     1.13  0.99  1.00  1.00  1.00 1.00  0.88  0.83   1471




TR    1800     1     1.07  0.99  1.00  1.00  1.00 1.00  0.92  1.00   1754


LT    1800     1     1.07  0.99  1.00  1.00  1.00 1.00  1.00  0.76   1449
```

```
                                1752-119                               I1PMBD
INTERSECTION :
PORTER @
CHELSEA
WEEKDAY   PM PEAK             BUILD               CBD ? Y
ACTUATED SIGNAL

----------------------------------------------------------------------------

                   C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW                GREEN    LN GR    V/C
APP   MVM     RATE  LT FLOW  FLW RT  RATIO     CRIT ?    RATIO  CAPACITY  RATIO
---   ---     ----  -------  ------  -----     ------    -----  --------  -----
EB    LTR      734        0    1471  0.499        Y      0.529       779  0.942


WB


NB    TR       344        0    1754  0.196        N      0.392       688  0.500


SB    LT       352        0    1449  0.243        Y      0.392       568  0.620

CYCLE LENGTH :    102.0              SUM OF CRITICAL LANES' FLOW RATIOS : 0.742
LOSS TIME PER CYCLE :     6          INTERSECTION V/C : 0.788

----------------------------------------------------------------------------
                    L E V E L   O F   S E R V I C E

     LN GR    V/C  GREEN  CYC    1st  LN GR    2nd          LN GR LN GR    APP  APP
APP   MVM   RATIO  RATIO  LEN  DELAY    CAP  DELAY    PF    DELAY   LOS  DELAY  LOS
---   ---   -----  -----  ---  -----    ---  -----    --    -----   ---  -----  ---
EB     LTR  0.942  0.529  102   17.1    779   14.2  0.85     26.6     D   26.5   D


WB


NB     TR   0.500  0.392  102   17.8    688    0.5  0.85     15.6     C   15.5   C


SB     LT   0.620  0.392  102   18.9    568    1.5  0.85     17.3     C   17.2   C


                                      INTERSECTION DELAY : 21.5 secs/veh
                                      LEVEL OF SERVICE : C
                                HMM ASSOCIATES                          6/6/1988

                                   1752-119                              I2AMBD
RSECTION :
ER @
ANS
DAY   AM PEAK             BUILD              CBD?Y
ATED SIGNAL
-------------------------------------------------------------------------------
      T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
  GRADE    HV    ADJ. PKG LN.   BUSES         CONF. PEDS    PED BUTTON     ARR
   (%)    (%)     Y/N   Nm      (Nb)    PHF   (peds/hr)     Y/N   SEC     TYPE
  -----   ---     ---------     ----    ----  ----------    ----------    ----

    0      2      N     0        0     0.90       0          N    0.0       3
    0      2      N     0        0     0.90       0          N    0.0       3
    0      2      N     0        0     0.90       0          N    0.0       3
    0      2      N     0        0     0.90       0          N    0.0       3


-------------------------------------------------------------------------------
                  G E O M E T R I C S  /  V O L U M E S
                                            LANE GROUPS
        VOLUME                  1                  2                  3
P   LT     TH     RT    MVM    LNS    WD    MVM   LNS    WD    MVM   LNS    WD
-  ----------------    ----------------    ----------------   ----------------
B    54     80     88   LTR     1    16.0
B    44     42      4   LTR     1    16.0
B    46      5     30   LTR     1    12.0
B     4     11     24   LTR     1     9.0


-------------------------------------------------------------------------------
                  S I G N A L   P H A S I N G
P    PHASE    1ST MV    2ND MV    3RD MV    PROT      PMSV         G       Y+R
-    -----    ------    ------    ------    ----      ----         --      ---
B     1         LTR                                    LR          40       33
B     1         LTR                                    LR          40       33
B     2         LTR                                    LR          25       48
B     2         LTR                                    LR          25       48
```

```
PAGE 1                              HMM ASSOCIATES                              6/6/1988

                                      1752-119                                   I2AMBD
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY    AM PEAK            BUILD               CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH    LANE  GROUP    FLOW RATE   LANE UTIL     ADJ FLOW     PROP OF TURNS
            MVM   VOLUME    IN GROUP    FACTOR        RATE         LT      RT
--------    ---   ------    --------    ------        ----        ----    ----
EB          LTR    222         247       1.00         247         0.24    0.40


WB          LTR     90         100       1.00         100         0.49    0.04


NB          LTR     81          90       1.00          90         0.57    0.37


SB          LTR     39          43       1.00          43         0.10    0.62



--------------------------------------------------------------------------------
                        S A T U R A T I O N    F L O W

           IDEAL    # OF    --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM  SAT FLOW  LANES   WIDTH  H.V.  GRADE  PARK   BUS   AREA    RT    LT    FLOW
--- ---  --------  -----   -----  ----  -----  ----   ----  ----  ----  ----   ----
EB  LTR    1800      1      1.13  0.99  1.00   1.00   1.00  0.90  0.85  0.99   1525


WB  LTR    1800      1      1.13  0.99  1.00   1.00   1.00  0.90  0.97  0.84   1477


NB  LTR    1800      1      1.00  0.99  1.00   1.00   1.00  0.90  0.85  0.96   1309


SB  LTR    1800      1      0.90  0.99  1.00   1.00   1.00  0.90  0.82  1.00   1184
```

```
                            1752-119                            I2AMBD
RSECTION :
ER @
ANS
DAY   AM PEAK          BUILD            CBD ? Y
ATED SIGNAL

-------------------------------------------------------------------------

               C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW             GREEN   LN GR    V/C
  MVM    RATE   LT FLOW  FLW RT  RATIO   CRIT ?   RATIO  CAPACITY  RATIO
  ---    ----   -------  ------  -----   ------   -----  --------  -----
  LTR     247       0      1525  0.162     Y      0.548      836   0.295


  LTR     100       0      1477  0.068     N      0.548      809   0.124


  LTR      90       0      1309  0.069     Y      0.342      448   0.201


  LTR      43       0      1184  0.036     N      0.342      405   0.106

E LENGTH :     73.0          SUM OF CRITICAL LANES' FLOW RATIOS : 0.231
 TIME PER CYCLE :     6      INTERSECTION V/C : 0.252

-------------------------------------------------------------------------
                L E V E L   O F   S E R V I C E

 LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
  MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
  ---   ----- -----  ---  -----  ---   -----   --    -----  ---   ----- ---
   LTR  0.295 0.548   73    6.8  836     0.1  0.85     5.9   B      5.9  B


   LTR  0.124 0.548   73    6.1  809     0.0  0.85     5.2   B      5.1  B


   LTR  0.201 0.342   73   12.9  448     0.0  0.85    11.0   B     10.8  B


   LTR  0.106 0.342   73   12.4  405     0.0  0.85    10.5   B     10.0  B


                               INTERSECTION DELAY :  7.0 secs/veh
                               LEVEL OF SERVICE : B
```

```
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   PM PEAK          BUILD             CBD?Y
ACTUATED SIGNAL
--------------------------------------------------------------------------------
            T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
         GRADE    HV    ADJ. PKG LN.   BUSES         CONF. PEDS    PED BUTTON    ARR
 APP      (%)    (%)     Y/N   Nm      (Nb)    PHF   (peds/hr)     Y/N   SEC     TYPE
 ---     -----   ---    ---------      ----    ----  ----------    ----------    ----
  EB       0      2       N     0        0     0.90      0          N    0.0       3
  WB       0      2       N     0        0     0.90      0          N    0.0       3
  NB       0      2       N     0        0     0.90      0          N    0.0       3
  SB       0      2       N     0        0     0.90      0          N    0.0       3


--------------------------------------------------------------------------------
                       G E O M E T R I C S  /  V O L U M E S
                                                 LANE GROUPS
              VOLUME                  1                   2                   3
  APP    LT     TH     RT     MVM   LNS    WD      MVM   LNS    WD      MVM   LNS    WD
  ---    ---------------      ----------------     ----------------     ----------------
   EB    16    187     74     LTR    1   16.0
   WB    36     57      4     LTR    1   16.0
   NB    83      7     19     LTR    1   12.0
   SB     4      7     22     LTR    1    9.0


--------------------------------------------------------------------------------
                         S I G N A L   P H A S I N G
  APP     PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV          G       Y+R
  ---     -----    ------    ------    ------    ----     ----         --       ---
   EB       1       LTR                                    LR          40        33
   WB       1       LTR                                    LR          40        33
   NB       2       LTR                                    LR          25        48
   SB       2       LTR                                    LR          25        48
```

```
                                   1752-119                                I2PMBD
RSECTION :
ER @
ANS
DAY   PM PEAK            BUILD               CBD ? Y
ATED SIGNAL

----------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

OACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW     PROP OF TURNS
      MVM  VOLUME     IN GROUP    FACTOR       RATE         LT      RT
----  ---  ------    --------    ------       ----         ----    ----
      LTR   277         308        1.00        308          0.06    0.27


      LTR    97         108        1.00        108          0.37    0.04


      LTR   109         121        1.00        121          0.76    0.17


      LTR    33          37        1.00         37          0.12    0.66



----------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT     FLOW
--- -------- -----  -----  ---- -----  ----  ---- ----  ----  ----    ----
LTR   1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.86  1.00   1559


LTR   1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.97  0.82   1441


LTR   1800     1     1.00  0.99  1.00  1.00  1.00  0.90  0.89  0.93   1327


LTR   1800     1     0.90  0.99  1.00  1.00  1.00  0.90  0.81  1.00   1169
```

```
                                  1752-119                               I2PMBD
INTERSECTION :
PORTER @
ORLEANS
WEEKDAY   PM PEAK            BUILD              CBD ? Y
ACTUATED SIGNAL

-----------------------------------------------------------------------------

                    C A P A C I T Y   A N A L Y S I S

    LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW              GREEN   LN GR    V/C
APP  MVM    RATE   LT FLOW  FLW RT  RATIO   CRIT ?    RATIO  CAPACITY RATIO
---  ---    ----   -------  ------  -----   ------    -----  -------- -----
EB   LTR     308        0     1559  0.198     Y       0.548      854  0.361


WB   LTR     108        0     1441  0.075     N       0.548      790  0.137


NB   LTR     121        0     1327  0.091     Y       0.342      454  0.267


SB   LTR      37        0     1169  0.032     N       0.342      400  0.092

CYCLE LENGTH :     73.0           SUM OF CRITICAL LANES' FLOW RATIOS : 0.289
LOSS TIME PER CYCLE :     6       INTERSECTION V/C : 0.315

-----------------------------------------------------------------------------
                     L E V E L   O F   S E R V I C E

    LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP  MVM  RATIO RATIO  LEN  DELAY  CAP   DELAY    PF    DELAY  LOS   DELAY LOS
---  ---  ----- -----  ---  -----  ---   -----    --    -----  ---   ----- ---
EB    LTR 0.361 0.548   73    7.1  854     0.1  0.85      6.1   B      6.1  B


WB    LTR 0.137 0.548   73    6.1  790     0.0  0.85      5.2   B      5.1  B


NB    LTR 0.267 0.342   73   13.2  454     0.1  0.85     11.3   B     11.1  B


SB    LTR 0.092 0.342   73   12.4  400     0.0  0.85     10.5   B     10.0  B



                                       INTERSECTION DELAY :  7.2 secs/veh
                                       LEVEL OF SERVICE : B
```

```
                             HMM ASSOCIATES                      6/6/1988

                                1752-119                            I3AMBD
RSECTION :
ER @
DIAN
DAY   AM PEAK           BUILD             CBD?Y
ATED SIGNAL
----------------------------------------------------------------------------
       T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
   GRADE   HV    ADJ. PKG LN.  BUSES        CONF. PEDS   PED BUTTON    ARR
    (%)    (%)    Y/N   Nm     (Nb)   PHF   (peds/hr)    Y/N   SEC    TYPE
   -----   ---    ---------    ----   ----  ----------   ----------   ----
     0      2      N     0      0     0.90      0         N    0.0      3
     0      2      N     0      0     0.90      0         N    0.0      3
     0      2      N     0      0     0.90      0         N    0.0      3


----------------------------------------------------------------------------
                 G E O M E T R I C S  /  V O L U M E S
                                          LANE GROUPS
        VOLUME                   1                 2                 3
P   LT     TH     RT    MVM   LNS   WD     MVM   LNS   WD     MVM   LNS   WD
-  ----------------     ----------------   ----------------   ----------------
B   111    90      0    LT      1   16.0
B     0    34    315    T       1   16.0   R      1   13.0
B     0     0     10    R       1    8.0


----------------------------------------------------------------------------
                   S I G N A L   P H A S I N G
P    PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV       G      Y+R
-    -----    ------    ------    ------    ----     ----       --      ---
B     1         LT                                    L         20       50
B     1         T         R                           R         20       50
B     2         R                                     R         25       45
```

```
PAGE 1                           HMM ASSOCIATES                       6/6/1988

                                    1752-119                            I3AMBD
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   AM PEAK           BUILD             CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------
                        V O L U M E   A D J U S T M E N T

APPROACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
          MVM   VOLUME    IN GROUP    FACTOR       RATE         LT      RT
--------  ---   ------    --------    ------       ----        ----    ----
EB        LT     201         223       1.00         223        0.55    0.00


WB        T       84          93       1.00          93        0.00    0.00
          R      315         350       1.00         350        0.00    1.00

SB        R       10          11       1.00          11        0.00    1.00



--------------------------------------------------------------------------------
                        S A T U R A T I O N   F L O W

         IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
APP MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT    FLOW
--- --- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
EB  LT    1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.67   1214


WB  T     1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812
    R     1800     1     1.03  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1404

SB  R     1800     1     0.87  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1186
```

```
                                1752-119                               I3AMBD
RSECTION :
ER @
DIAN
DAY   AM PEAK           BUILD              CBD ? Y
ATED SIGNAL

-----------------------------------------------------------------------------


                  C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW               GREEN    LN GR    V/C
  MVM     RATE  LT FLOW  FLW RT  RATIO    CRIT ?    RATIO  CAPACITY  RATIO
  ---     ----  -------  ------  -----    ------    -----  --------  -----
  LT       223        0    1214  0.184      N       0.286       347  0.643


  T         93        0    1812  0.051      N       0.286       518  0.180
  R        350        0    1404  0.249      Y       0.286       401  0.873

  R         11        0    1186  0.009      Y       0.357       424  0.026

E LENGTH :    70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.258
 TIME PER CYCLE :     6        INTERSECTION V/C : 0.282

-----------------------------------------------------------------------------
                   L E V E L   O F   S E R V I C E

 LN GR    V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
  MVM   RATIO  RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS   DELAY LOS
  ---   -----  -----  ---  -----  ---   -----   --    -----  ---   ----- ---
   LT   0.643  0.286   70   16.6  347     2.8  0.85    16.5   C     16.4  C


   T    0.180  0.286   70   14.3  518     0.0  0.85    12.2   B
   R    0.873  0.286   70   18.1  401    13.0  0.85    26.4   D     23.4  C

   R    0.026  0.357   70   11.1  424     0.0  0.85     9.4   B      8.0  B



                                    INTERSECTION DELAY : 20.7 secs/veh
                                    LEVEL OF SERVICE : C
```

```
                                  HMM ASSOCIATES                                   5/26/1988

                                     1752-119                                         I3PMBD
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   PM PEAK              BUILD               CBD?Y
ACTUATED SIGNAL
-------------------------------------------------------------------------------------------
           T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
        GRADE    HV    ADJ. PKG LN.   BUSES          CONF. PEDS   PED BUTTON    ARR
 APP     (%)    (%)     Y/N   Nm      (Nb)    PHF    (peds/hr)    Y/N   SEC     TYPE
 ---    -----   ---    ---------      ----    ----   ----------   ----------    ----
  EB      0      2      N     0        0      0.90       0         N    0.0      3
  WB      0      2      N     0        0      0.90       0         N    0.0      3
  SB      0      2      N     0        0      0.90       0         N    0.0      3

-------------------------------------------------------------------------------------------
                      G E O M E T R I C S  /  V O L U M E S
                                                LANE GROUPS
             VOLUME                   1                     2                    3
  APP   LT     TH     RT     MVM   LNS    WD     MVM   LNS    WD     MVM   LNS    WD
  ---   -------------        ---------------     ---------------     ---------------
   EB    93   101     0      LT     1    16.0
   WB     0    88   318      T      1    16.0     R      1   13.0
   SB     0     0    10      R      1     8.0

-------------------------------------------------------------------------------------------
                         S I G N A L   P H A S I N G
  APP     PHASE    1ST MV   2ND MV   3RD MV    PROT     PMSV        G      Y+R
  ---     -----    ------   ------   ------    ----     ----        --     ---
   EB       1        LT                                   L         20      50
   WB       1        T        R                           R         20      50
   SB       2        R                                    R         25      45
```

```
i                          HMM ASSOCIATES                        5/26/1988

                              1752-119                             I3PMBD
RSECTION :
ER @
DIAN
DAY   PM PEAK            BUILD            CBD ? Y
ATED SIGNAL

-------------------------------------------------------------------------------
                  V O L U M E   A D J U S T M E N T

OACH   LANE GROUP    FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
      MVM  VOLUME     IN GROUP    FACTOR       RATE         LT     RT
----  ---  ------    --------    ------       ----         ----   ----
      LT     194        216        1.00        216         0.48   0.00


      T       88         98        1.00         98         0.00   0.00
      R      318        353        1.00        353         0.00   1.00

      R       10         11        1.00         11         0.00   1.00



-------------------------------------------------------------------------------
                  S A T U R A T I O N    F L O W

    IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK  BUS  AREA   RT    LT    FLOW
--- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
LT    1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.69   1250


T     1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812
R     1800     1     1.03  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1404

R     1800     1     0.87  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1186
```

```
                                   1752-119                             I3PMBD
INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY   PM PEAK            BUILD               CBD ? Y
ACTUATED SIGNAL

-------------------------------------------------------------------------------

                     C A P A C I T Y   A N A L Y S I S

     LN GR ADJ FLOW   PMSV  ADJ SAT  FLOW               GREEN    LN GR    V/C
APP   MVM    RATE  LT FLOW  FLW RT  RATIO     CRIT ?   RATIO  CAPACITY  RATIO
---   ---    ----  -------  ------  -----     ------   -----  --------  -----
EB    LT      216        0    1250  0.173        N     0.286       357  0.605


WB    T        98        0    1812  0.054        N     0.286       518  0.189
      R       353        0    1404  0.251        Y     0.286       401  0.880

SB    R        11        0    1186  0.009        Y     0.357       424  0.026

CYCLE LENGTH :     70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.260
LOSS TIME PER CYCLE :    6          INTERSECTION V/C : 0.284

-------------------------------------------------------------------------------
                      L E V E L   O F   S E R V I C E

     LN GR   V/C  GREEN  CYC   1st  LN GR   2nd         LN GR LN GR   APP  APP
APP   MVM   RATIO RATIO  LEN  DELAY  CAP   DELAY   PF   DELAY  LOS   DELAY LOS
---   ---   ----- -----  ---  -----  ---   -----   --   -----  ---   ----- ---
EB     LT   0.605 0.286   70   16.4  357     2.1  0.85   15.7   C     15.6  C


WB     T    0.189 0.286   70   14.3  518     0.0  0.85   12.2   B
       R    0.880 0.286   70   18.1  401    13.7  0.85   27.0   D     23.7  C

SB     R    0.026 0.357   70   11.1  424     0.0  0.85    9.4   B      8.0  B


                                     INTERSECTION DELAY : 20.7 secs/veh
                                     LEVEL OF SERVICE : C
```

```
                              HMM ASSOCIATES                        6/6/1988

                                 1752-119                            I4AMBD
RSECTION :
ER @
AN     AM
DAY       PEAK           BUILD            CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------

N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN        THROUGH       RIGHT TURN
---       ---------        -------       ----------

EB           5.00            ---            ---

WB           5.00            ---            ---

NB           6.50            6.00           5.50

SB           6.50            6.00           5.50

--------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1           LANE 2           LANE 3
P       L    T    R     L    T    R     L    T    R
-     --------------  --------------  --------------

       51    0    0     0  162   36     0    0    0
        7   46   49     0    0    0     0    0    0
        2   29    0     0    0    0     0    0    0
       83  210    0     0    0    0     0    0    0

--------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1   LANE 2   LANE 3
-                          -------  -------  -------

      RESERVE CAPACITY      1039      ---      ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       975      ---      ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       592      ---      ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       347      ---      ---
      LEVEL OF SERVICE        B

R STREET - EB/WB
```

```
                                   HMM ASSOCIATES                                   5/6/1988

                                      1752-119                                        I4PMED
INTERSECTION :
PORTER @
BREMAN
WEEKDAY    PM PEAK             BUILD              CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------------------------

    U N S I G N A L I Z E D   C R I T I C A L   G A P S

               -----------CRITICAL GAPS (SEC)----------
    APP        LEFT TURN       THROUGH       RIGHT TURN
    ---        ---------       -------       ----------

    EB            5.00           ---            ---

    WB            5.00           ---            ---

    NB            6.50           6.00           5.50

    SB            6.50           6.00           5.50

---------------------------------------------------------------------------------------------

         V O L U M E   A L L O C A T I O N   T O   L A N E S

                LANE 1             LANE 2             LANE 3
  APP        L     T    R       L     T    R       L     T    R
  ---     --------------     --------------     --------------

  EB        40     0    0       0   253   40       0     0    0
  WB         3    94   55       0     0    0       0     0    0
  NB        21   146   11       0     0    0       0     0    0
  SB        98   183    0       0     0    0       0     0    0

---------------------------------------------------------------------------------------------

                       U N S I G N A L I Z E D

  APP                             LANE 1     LANE 2     LANE 3
  ---                             -------    -------    -------

  EB      RESERVE CAPACITY          992        ---        ---
          LEVEL OF SERVICE           A

  WB      RESERVE CAPACITY          886        ---        ---
          LEVEL OF SERVICE           A

  NB      RESERVE CAPACITY          336        ---        ---
          LEVEL OF SERVICE           B

  SB      RESERVE CAPACITY          184        ---        ---
          LEVEL OF SERVICE           D

 MAJOR STREET - EB/WB
```

```
                             HMM ASSOCIATES                      6/2/1988

                                1752-119                            ISAMBD
RSECTION :
RICK @
DIAN
DAY   AM PEAK           BUILD             CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           6.00           5.50           5.00

SB           6.00           5.50           5.00

---------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1           LANE 2           LANE 3
P      L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

        0    1    0      0    0    0      0    0    0
        0   61    0      0    0  238      0    0    0
       29    0    0      0  339   80      0    0    0
      297    0   25      0    0    0      0    0    0
---------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                         LANE 1    LANE 2    LANE 3
-                         -------   -------   -------

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      870       416       ---
      LEVEL OF SERVICE       A         A

      RESERVE CAPACITY       48       ---       ---
      LEVEL OF SERVICE       E

R STREET - EB/WB
```

```
                                 HMM ASSOCIATES                        6/6/1988

                                    1752-119                            ISPMBD
INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY   PM PEAK          BUILD              CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

              -----------CRITICAL GAPS (SEC)----------
    APP       LEFT TURN      THROUGH       RIGHT TURN
    ---       ---------      -------       ----------

    EB           5.00          ---            ---

    WB           5.00          ---            ---

    NB           5.75          5.00           5.00

    SB           5.75          5.00           5.00

-----------------------------------------------------------------------------

         V O L U M E   A L L O C A T I O N   T O   L A N E S

             LANE 1           LANE 2           LANE 3
  APP      L    T    R      L    T    R      L    T    R
  ---    --------------   --------------   --------------

  EB       0    1    0      0    0    0      0    0    0
  WB       0   46    0      0    0  374      0    0    0
  NB      22    0    0      0  321  144      0    0    0
  SB     336    0   50      0    0    0      0    0    0

-----------------------------------------------------------------------------

                       U N S I G N A L I Z E D

  APP                           LANE 1    LANE 2    LANE 3
  ---                           -------   -------   -------

  EB      RESERVE CAPACITY        ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY        ---       ---       ---
          LEVEL OF SERVICE

  NB      RESERVE CAPACITY        853       400       ---
          LEVEL OF SERVICE         A         A

  SB      RESERVE CAPACITY        -23       ---       ---
          LEVEL OF SERVICE      FAILURE

  MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                              5/26/1988

                                 1752-119                                  I6AMBD
RSECTION :
RICK @
ANS
DAY   AM PEAK            BUILD               CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           6.50           6.00           5.50

SB           6.50           6.00           5.50

----------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1           LANE 2           LANE 3
P       L    T    R      L    T    R      L    T    R
-     --------------   --------------   --------------

        0    0   10      0    0    0      0    0    0
       25    0    0      0  333    3      0    0    0
       78   71    0      0    0    0      0    0    0
        0   66   15      0    0    0      0    0    0

----------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                          LANE 1    LANE 2    LANE 3
-                          -------   -------   -------

      RESERVE CAPACITY       ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      1163       ---       ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       403       ---       ---
      LEVEL OF SERVICE        A

      RESERVE CAPACITY       575       ---       ---
      LEVEL OF SERVICE        A

R STREET - EB/WB
```

```
                              HMM ASSOCIATES                         6/6/1988

                                1752-119                              I6PMBD
INTERSECTION :
MAVERICK @
ORLEANS
WEEKDAY   PM PEAK         BUILD              CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

--------------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN      THROUGH       RIGHT TURN
    ---      ---------      -------       ----------

    EB          5.00          ---            ---

    WB          5.00          ---            ---

    NB          6.50          6.00           5.50

    SB          6.50          6.00           5.50

--------------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---      --------------    --------------    --------------

  EB         0    0   10       0    0    0       0    0    0
  WB        32    0    0       0  362   16       0    0    0
  NB       159   82    0       0    0    0       0    0    0
  SB         0   41   41       0    0    0       0    0    0

--------------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                             LANE 1    LANE 2    LANE 3
  ---                             -------   -------   -------

  EB        RESERVE CAPACITY        ---       ---       ---
            LEVEL OF SERVICE

  WB        RESERVE CAPACITY       1155       ---       ---
            LEVEL OF SERVICE         A

  NB        RESERVE CAPACITY        260       ---       ---
            LEVEL OF SERVICE         C

  SB        RESERVE CAPACITY        574       ---       ---
            LEVEL OF SERVICE         A

MAJOR STREET - EB/WB
```

```
                             HMM ASSOCIATES                      5/26/1988

                                1752-119                             I7AMBD
RSECTION :
RICK @
AGE
DAY   AM PEAK             BUILD                 CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN       THROUGH       RIGHT TURN
---       ---------       -------       ----------

EB           5.00           ---            ---

WB           5.00           ---            ---

NB           6.50           6.00           5.50

SB           6.50           6.00           5.50


---------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1           LANE 2           LANE 3
P       L    T    R      L    T    R      L    T    R
-    --------------   --------------   --------------

        0    0   10      0    0    0      0    0    0
       19  296    0      0    0    0      0    0    0
        0    0   10      0    0    0      0    0    0
        0   34   34      0    0    0      0    0    0

---------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                         LANE 1    LANE 2    LANE 3
-                         -------   -------   -------

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY     1169       ---       ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY     1083       ---       ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY      660       ---       ---
      LEVEL OF SERVICE       A

R STREET - EB/WB
```

```
                        HMM ASSOCIATES                          5/26/1988

                          1752-119                               I7PMBD
INTERSECTION :
MAVERICK @
COTTAGE
WEEKDAY   PM PEAK          BUILD           CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

              -----------CRITICAL GAPS (SEC)----------
    APP       LEFT TURN      THROUGH       RIGHT TURN
    ---       ---------      -------       ----------

    EB          5.00           ---            ---

    WB          5.00           ---            ---

    NB          6.50           6.00           5.50

    SB          6.50           6.00           5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1            LANE 2           LANE 3
  APP       L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB        0    0   10       0    0    0       0    0    0
  WB       24  329    0       0    0    0       0    0    0
  NB        0    0   10       0    0    0       0    0    0
  SB        0   69   53       0    0    0       0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                            LANE 1    LANE 2    LANE 3
  ---                            -------   -------   -------

  EB      RESERVE CAPACITY         ---       ---       ---
          LEVEL OF SERVICE

  WB      RESERVE CAPACITY        1164       ---       ---
          LEVEL OF SERVICE          A

  NB      RESERVE CAPACITY        1083       ---       ---
          LEVEL OF SERVICE          A

  SB      RESERVE CAPACITY         565       ---       ---
          LEVEL OF SERVICE          A

MAJOR STREET - EB/WB
```

```
                                        HMM ASSOCIATES                               5/26/1988

                                            1752-119                                  18AMBD
RSECTION :
ER @
AN
DAY   AM PEAK              BUILD                 CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

----------------------------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

            -----------CRITICAL GAPS (SEC)----------
APP         LEFT TURN        THROUGH         RIGHT TURN
---         ---------        -------         ----------

EB              5.00           ---              ---

/B              5.00           ---              ---

\B              6.50           6.00             5.50

SB              6.50           6.00             5.50

----------------------------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

           LANE 1               LANE 2               LANE 3
P       L     T     R      L     T     R       L     T     R
-     --------------     --------------      --------------

        29   335   48      0     0     0       0     0     0
         1   115   14      0     0     0       0     0     0
        38    70   16      0     0     0       0     0     0
        70    25   46      0     0     0       0     0     0

----------------------------------------------------------------------------------------------

                  U N S I G N A L I Z E D

P                           LANE 1     LANE 2     LANE 3
-                           -------    -------    -------

      RESERVE CAPACITY       1025        ---        ---
      LEVEL OF SERVICE         A

      RESERVE CAPACITY        806        ---        ---
      LEVEL OF SERVICE         A

      RESERVE CAPACITY        376        ---        ---
      LEVEL OF SERVICE         B

      RESERVE CAPACITY        353        ---        ---
      LEVEL OF SERVICE         B

R STREET - EB/WB
```

```
                              1752-119                         I8PMBD
INTERSECTION :
SUMNER @
BREMAN
WEEKDAY   PM PEAK          BUILD              CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

              -----------CRITICAL GAPS (SEC)----------
    APP       LEFT TURN      THROUGH      RIGHT TURN
    ---       ---------      -------      ----------

    EB          5.00           ---           ---

    WB          5.00           ---           ---

    NB          6.50          6.00          5.50

    SB          6.50          6.00          5.50

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

              LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---      --------------    --------------    --------------

  EB        25  380   67      0    0    0       0    0    0
  WB         1  113   14      0    0    0       0    0    0
  NB        27   60   34      0    0    0       0    0    0
  SB        95   20   17      0    0    0       0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                            LANE 1    LANE 2    LANE 3
  ---                            -------   -------   -------

  EB       RESERVE CAPACITY       1031       ---       ---
           LEVEL OF SERVICE         A

  WB       RESERVE CAPACITY        752       ---       ---
           LEVEL OF SERVICE         A

  NB       RESERVE CAPACITY        391       ---       ---
           LEVEL OF SERVICE         B

  SB       RESERVE CAPACITY        251       ---       ---
           LEVEL OF SERVICE         C

MAJOR STREET - EB/WB
```

```
                       HMM ASSOCIATES                  6/6/1988

                         1752-119                         I9AMBD
RSECTION :
ER @
ANS
DAY   AM PEAK          BUILD             CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

        -----------CRITICAL GAPS (SEC)----------
APP     LEFT TURN     THROUGH      RIGHT TURN
---     ---------     -------      ----------

EB        5.00          ---           ---

WB        5.00          ---           ---

NB        6.00          5.50          5.00

SB        6.00          5.50          5.00

------------------------------------------------------------

   V O L U M E   A L L O C A T I O N   T O   L A N E S

       LANE 1        LANE 2        LANE 3
P     L   T   R     L   T   R     L   T   R
-   -----------   -----------   -----------

     55 182 137     0   0   0     0   0   0
      0   0  10     0   0   0     0   0   0
    131 111  16     0   0   0     0   0   0
     30  49   4     0   0   0     0   0   0

------------------------------------------------------------

              U N S I G N A L I Z E D

P                    LANE 1   LANE 2   LANE 3
-                    -------  -------  -------

     RESERVE CAPACITY  1132     ---      ---
     LEVEL OF SERVICE   A

     RESERVE CAPACITY   ---     ---      ---
     LEVEL OF SERVICE

     RESERVE CAPACITY   420     ---      ---
     LEVEL OF SERVICE   A

     RESERVE CAPACITY   528     ---      ---
     LEVEL OF SERVICE   A

R STREET - EB/WB
```

```
                         HMM ASSOCIATES                              5/6/1988

                            1752-119                                  I9PMBD
INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY   PM PEAK          BUILD            CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

   U N S I G N A L I Z E D   C R I T I C A L   G A P S

             -----------CRITICAL GAPS (SEC)----------
    APP      LEFT TURN      THROUGH      RIGHT TURN
    ---      ---------      -------      ----------

    EB          5.00          ---           ---

    WB          5.00          ---           ---

    NB          6.00          5.50          5.00

    SB          6.00          5.50          5.00

-----------------------------------------------------------------------------

        V O L U M E   A L L O C A T I O N   T O   L A N E S

               LANE 1            LANE 2            LANE 3
  APP        L    T    R       L    T    R       L    T    R
  ---     --------------    --------------    --------------

  EB        83  346   78       0    0    0       0    0    0
  WB         0    0   10       0    0    0       0    0    0
  NB       127  204   36       0    0    0       0    0    0
  SB        10   41   10       0    0    0       0    0    0

-----------------------------------------------------------------------------

                        U N S I G N A L I Z E D

  APP                             LANE 1    LANE 2    LANE 3
  ---                             -------   -------   -------

  EB       RESERVE CAPACITY        1104       ---       ---
           LEVEL OF SERVICE         A

  WB       RESERVE CAPACITY        ---        ---       ---
           LEVEL OF SERVICE

  NB       RESERVE CAPACITY         202       ---       ---
           LEVEL OF SERVICE          C

  SB       RESERVE CAPACITY         473       ---       ---
           LEVEL OF SERVICE          A

 MAJOR STREET - EB/WB
```

```
                              HMM ASSOCIATES                    5/26/1988

                                 1752-119                        I10AMBD
RSECTION :
ER @
AGE
DAY   AM PEAK           BUILD            CBD?Y
GNALIZED
AJOR STREET RUNS EAST / WEST

---------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN        THROUGH        RIGHT TURN
---       ---------        -------        ----------

EB           5.00            ---             ---

WB           5.00            ---             ---

NB           6.50            6.00            5.50

SB           6.50            6.00            5.50

---------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1            LANE 2            LANE 3
       L    T    R       L    T    R       L    T    R
     --------------    --------------    --------------

        0  201   51      0    0    0       0    0    0
        0    0   10      0    0    0       0    0    0
        0    0   10      0    0    0       0    0    0
       21   22    0      0    0    0       0    0    0

---------------------------------------------------------------------------

                  U N S I G N A L I Z E D

                          LANE 1    LANE 2    LANE 3
                          -------   -------   -------

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      844       ---       ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY      660       ---       ---
      LEVEL OF SERVICE       A

R STREET - EB/WB
```

```
                            HMM ASSOCIATES                                   6/6/1988

                               1752-119                                      I10PMBD
INTERSECTION :
SUMNER @
COTTAGE
WEEKDAY   PM PEAK            BUILD              CBD7Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

  UNSIGNALIZED  CRITICAL  GAPS

             -----------CRITICAL GAPS (SEC)----------
   APP       LEFT TURN       THROUGH       RIGHT TURN
   ---       ---------       -------       ----------

   EB           5.00           ---            ---

   WB           5.00           ---            ---

   NB           6.50           6.00           5.50

   SB           6.50           6.00           5.50

-----------------------------------------------------------------------------

       VOLUME  ALLOCATION  TO  LANES

              LANE 1           LANE 2           LANE 3
 APP       L    T    R      L    T    R      L    T    R
 ---     --------------   --------------   --------------

 EB        0  334   58      0    0    0      0    0    0
 WB        0    0   10      0    0    0      0    0    0
 NB        0    0   10      0    0    0      0    0    0
 SB       24   30    0      0    0    0      0    0    0

-----------------------------------------------------------------------------

                      UNSIGNALIZED

 APP                            LANE 1    LANE 2    LANE 3
 ---                            -------   -------   -------

 EB       RESERVE CAPACITY        ---       ---       ---
          LEVEL OF SERVICE

 WB       RESERVE CAPACITY        ---       ---       ---
          LEVEL OF SERVICE

 NB       RESERVE CAPACITY        720       ---       ---
          LEVEL OF SERVICE         A

 SB       RESERVE CAPACITY        535       ---       ---
          LEVEL OF SERVICE         A

 MAJOR STREET - EB/WB
```

```
                                  HMM ASSOCIATES                               5/26/1988

                                     1752-119                                  I11AMBD
RSECTION :
ER @
SEA
DAY    AM PEAK             BUILD              CBD?Y
ATED SIGNAL
--------------------------------------------------------------------------------------
       T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
   GRADE    HV    ADJ. PKG LN.  BUSES          CONF. PEDS   PED BUTTON     ARR
    (%)     (%)    Y/N   Nm     (Nb)    PHF    (peds/hr)    Y/N   SEC      TYPE
   -----    ---   ----------    ----    ----   ----------   ----------     ----
     0       2     N     0       0      0.90       0         N    0.0        3
     0       2     N     0       0      0.90       0         N    0.0        3
     0       2     N     0       0      0.90       0         N    0.0        3


--------------------------------------------------------------------------------------
                  G E O M E T R I C S  /  V O L U M E S
                                                LANE GROUPS
        VOLUME                    1                    2                    3
    LT     TH     RT      MVM   LNS    WD      MVM   LNS    WD      MVM   LNS    WD
   ----------------      ----------------      ----------------     ----------------
     0     90      0      T       1    16.0
     0    196      0      T       2    29.0
   321      0    205      L       1    16.0     R       1   16.0


--------------------------------------------------------------------------------------
                    S I G N A L   P H A S I N G
    PHASE    1ST MV    2ND MV    3RD MV    PROT     PMSV        G      Y+R
    -----    ------    ------    ------    ----     ----        --     ---
      1        T                                                20      50
      1        T                                                20      50
      2        L         R                          LR          25      45
```

```
                                                1752-119                                        I11AMBD
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY    AM PEAK              BUILD                CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------------------------
                            V O L U M E   A D J U S T M E N T

APPROACH    LANE  GROUP     FLOW RATE    LANE UTIL     ADJ FLOW     PROP OF  TURNS
             MVM   VOLUME    IN GROUP     FACTOR        RATE         LT       RT
--------    ---   ------    --------      ------        ----        ----     ----
EB           T       90        100         1.00          100         0.00     0.00


WB           T      196        218         1.05          229         0.00     0.00


SB           L      321        357         1.00          357         1.00     0.00
             R      205        228         1.00          228         0.00     1.00

--------------------------------------------------------------------------------------------
                            S A T U R A T I O N    F L O W

            IDEAL    # OF    --------------ADJUSTMENT FACTORS---------------     ADJ.
APP MVM  SAT FLOW  LANES    WIDTH   H.V.  GRADE   PARK    BUS   AREA    RT     LT     FLOW
--- ---  --------  -----    -----   ----  -----   ----   ----   ----   ----   ----    ----
EB   T     1800      1       1.13   0.99   1.00   1.00   1.00   0.90   1.00   1.00    1812


WB   T     1800      2       1.08   0.99   1.00   1.00   1.00   0.90   1.00   1.00    3464


SB   L     1800      1       1.13   0.99   1.00   1.00   1.00   0.90   1.00   0.85    1540
     R     1800      1       1.13   0.99   1.00   1.00   1.00   0.90   0.85   1.00    1540
```

```
                                   1752-119                              I11AMBD
RSECTION :
ER @
SEA
DAY    AM PEAK            BUILD              CBD ? Y
ATED SIGNAL

----------------------------------------------------------------------------

                C A P A C I T Y   A N A L Y S I S

 LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW                GREEN    LN GR     V/C
  MVM     RATE   LT FLOW  FLW RT  RATIO   CRIT ?      RATIO  CAPACITY  RATIO
  ---     ----   -------  ------  -----   ------      -----  --------  -----
  T        100         0    1812  0.055      N        0.286       518  0.193


  T        229         0    3464  0.066      Y        0.286       990  0.231


  L        357         0    1540  0.232      Y        0.357       550  0.649
  R        228         0    1540  0.148      N        0.357       550  0.415

: LENGTH :     70.0            SUM OF CRITICAL LANES' FLOW RATIOS : 0.298
 TIME PER CYCLE :     6        INTERSECTION V/C : 0.326

----------------------------------------------------------------------------
                 L E V E L   O F   S E R V I C E

 LN GR    V/C  GREEN  CYC    1st  LN GR    2nd            LN GR LN GR    APP  APP
  MVM   RATIO RATIO   LEN  DELAY   CAP   DELAY     PF    DELAY  LOS   DELAY LOS
  ---   ----- -----   ---  -----   ---   -----     --    -----  ---   ----- ---
   T    0.193 0.286    70   14.4   518     0.0   0.85     12.2    B     12.0  B


   T    0.231 0.286    70   14.5   990     0.0   0.85     12.3    B     12.2  B


   L    0.649 0.357    70   14.3   550     1.9   0.85     13.8    B
   R    0.415 0.357    70   12.9   550     0.3   0.85     11.2    B     12.8  B

                                    INTERSECTION DELAY : 12.5 secs/veh
                                    LEVEL OF SERVICE : B
```

```
                                  HMM ASSOCIATES                            5/26/1988

                                     1752-119                                I11PMBD
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   PMN PEAK           BUILD              CBD?Y
ACTUATED SIGNAL
--------------------------------------------------------------------------------
          T R A F F I C  &  R O A D W A Y   C O N D I T I O N S
       GRADE    HV    ADJ. PKG LN.   BUSES          CONF. PEDS    PED BUTTON    ARR
APP     (%)     (%)    Y/N   Nm      (Nb)    PHF    (peds/hr)     Y/N    SEC    TYPE
---    -----    ---   ---------      ----    ----   ----------    ----------    ----
 EB      0       2     N     0        0      0.90       0          N     0.0      3
 WB      0       2     N     0        0      0.90       0          N     0.0      3
 SB      0       2     N     0        0      0.90       0          N     0.0      3


--------------------------------------------------------------------------------
                    G E O M E T R I C S  /  V O L U M E S
                                               LANE GROUPS
              VOLUME                 1                  2                  3
 APP    LT     TH     RT    MVM    LNS    WD     MVM    LNS    WD     MVM    LNS    WD
 ---   ---------------      ----------------     ----------------     ----------------
  EB     0    101      0    T        1   16.0
  WB     0    158      0    T        2   29.0
  SB   372      0    248    L        1   16.0    R        1   16.0


--------------------------------------------------------------------------------
                      S I G N A L   P H A S I N G
 APP     PHASE     1ST MV     2ND MV     3RD MV     PROT     PMSV        G      Y+R
 ---     -----     ------     ------     ------     ----     ----        --     ---
  EB       1         T                                                   20      50
  WB       1         T                                                   20      50
  SB       2         L          R                            LR          25      45
 1                           HMM ASSOCIATES                       5/26/1988

                                1752-119                             I11PMBD
RSECTION :
ER @
SEA
DAY   PMN PEAK         BUILD            CBD ? Y
ATED SIGNAL

----------------------------------------------------------------------------
                    V O L U M E   A D J U S T M E N T

OACH   LANE GROUP   FLOW RATE   LANE UTIL    ADJ FLOW    PROP OF TURNS
      MVM   VOLUME   IN GROUP    FACTOR       RATE        LT      RT
----  ---   ------   ---------   ------       ----       ----    ----
      T      101        112       1.00         112       0.00    0.00


      T      158        176       1.05         185       0.00    0.00


      L      372        413       1.00         413       1.00    0.00
      R      248        276       1.00         276       0.00    1.00


----------------------------------------------------------------------------
                    S A T U R A T I O N   F L O W

     IDEAL   # OF   --------------ADJUSTMENT FACTORS---------------   ADJ.
MVM SAT FLOW LANES  WIDTH  H.V. GRADE  PARK   BUS  AREA   RT    LT    FLOW
--- -------- -----  -----  ---- -----  ----  ----  ----  ----  ----   ----
T     1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  1.00   1812


T     1800     2     1.08  0.99  1.00  1.00  1.00  0.90  1.00  1.00   3464


      1800     1     1.13  0.99  1.00  1.00  1.00  0.90  1.00  0.85   1540
R     1800     1     1.13  0.99  1.00  1.00  1.00  0.90  0.85  1.00   1540
```

```
                                1752-119                         I11PMBD
INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY   PMN PEAK           BUILD              CBD ? Y
ACTUATED SIGNAL

--------------------------------------------------------------------------

                 C A P A C I T Y   A N A L Y S I S

    LN GR ADJ FLOW    PMSV  ADJ SAT  FLOW              GREEN    LN GR    V/C
APP  MVM     RATE  LT FLOW  FLW RT  RATIO   CRIT ?    RATIO  CAPACITY  RATIO
---  ---     ----  -------  ------  -----   ------    -----  --------  -----
EB   T        112        0    1812  0.062     Y       0.286       518  0.216


WB   T        185        0    3464  0.053     N       0.286       990  0.187


SB   L        413        0    1540  0.268     Y       0.357       550  0.751
     R        276        0    1540  0.179     N       0.357       550  0.502

CYCLE LENGTH :     70.0             SUM OF CRITICAL LANES' FLOW RATIOS : 0.330
LOSS TIME PER CYCLE :     6         INTERSECTION V/C : 0.361

--------------------------------------------------------------------------
                  L E V E L   O F   S E R V I C E

     LN GR   V/C  GREEN  CYC   1st  LN GR   2nd          LN GR LN GR   APP  APP
APP   MVM  RATIO RATIO  LEN  DELAY  CAP   DELAY   PF    DELAY  LOS  DELAY LOS
---   ---  ----- -----  ---  -----  ---   -----   --    -----  ---  ----- ---
EB     T   0.216 0.286   70   14.5   518    0.0  0.85    12.3   B    12.1  B


WB     T   0.187 0.286   70   14.3   990    0.0  0.85    12.2   B    12.1  B


SB     L   0.751 0.357   70   15.0   550    4.0  0.85    16.1   C
       R   0.502 0.357   70   13.4   550    0.6  0.85    11.9   B    14.4  B


                                   INTERSECTION DELAY : 13.7 secs/veh
                                   LEVEL OF SERVICE : B
```

```
                          HMM ASSOCIATES                              5/26/1988

                             1752-19                                   I12AMBD
RSECTION :
RICK @
EA
DAY   AM PEAK          BUILD            CBD?Y
NALIZED
AJOR STREET RUNS EAST / WEST

-----------------------------------------------------------------------------

 N S I G N A L I Z E D   C R I T I C A L   G A P S

          -----------CRITICAL GAPS (SEC)----------
APP       LEFT TURN        THROUGH       RIGHT TURN
---       ---------        -------       ----------

EB           5.00            ---            ---

WB           5.00            ---            ---

NB           0.00            0.00           0.00

SB           6.50            6.00           5.50

-----------------------------------------------------------------------------

    V O L U M E   A L L O C A T I O N   T O   L A N E S

         LANE 1            LANE 2            LANE 3
       L    T    R      L    T    R      L    T    R
     --------------   --------------   --------------

      69    0    0      0    0  320      0    0    0
      55  137    0      0  134  114      0    0    0
       0    0    0      0    0    0      0    0    0
       0  151   29      0    0    0      0    0    0
-----------------------------------------------------------------------------

                  U N S I G N A L I Z E D

                          LANE 1    LANE 2    LANE 3
                          -------   -------   -------

      RESERVE CAPACITY      736       ---       ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY      808       ---       ---
      LEVEL OF SERVICE       A

      RESERVE CAPACITY      ---       ---       ---
      LEVEL OF SERVICE

      RESERVE CAPACITY      197       ---       ---
      LEVEL OF SERVICE       D

R STREET - EB/WB
```

```
                         HMM ASSOCIATES                         5/26/1988

                            1752-119                              I12PMBD
INTERSECTION :
MAVERICK @
CHELSEA
WEEKDAY   PM PEAK          BUILD           CBD?Y
UNSIGNALIZED
 - MAJOR STREET RUNS EAST - WEST

---------------------------------------------------------------------------

   UNSIGNALIZED  CRITICAL  GAPS

            -----------CRITICAL GAPS (SEC)----------
   APP      LEFT TURN      THROUGH       RIGHT TURN
   ---      ---------      -------       ----------

   EB          5.00           ---           ---

   WB          5.00           ---           ---

   NB          0.00          0.00          0.00

   SB          6.50          6.00          5.50

---------------------------------------------------------------------------

       VOLUME  ALLOCATION  TO  LANES

              LANE 1           LANE 2           LANE 3
  APP      L    T    R      L    T    R      L    T    R
  ---    --------------   --------------   --------------

  EB      106    0    0      0    0  372      0    0    0
  WB       61  198    0      0  149  171      0    0    0
  NB        0    0    0      0    0    0      0    0    0
  SB        0  182   73      0    0    0      0    0    0

---------------------------------------------------------------------------

                      UNSIGNALIZED

  APP                             LANE 1   LANE 2   LANE 3
  ---                             -------  -------  -------

  EB      RESERVE CAPACITY          589      ---      ---
          LEVEL OF SERVICE           A

  WB      RESERVE CAPACITY          755      ---      ---
          LEVEL OF SERVICE           A

  NB      RESERVE CAPACITY          ---      ---      ---
          LEVEL OF SERVICE

  SB      RESERVE CAPACITY           45      ---      ---
          LEVEL OF SERVICE           E

MAJOR STREET - EB/WB
```

7371 015

BOSTON PUBLIC LIBRARY
3 9999 06314 933 8